U.S. Department of Energy
Energy Efficiency and Renewable Energy

MULTI-YEAR PROGRAM PLAN TEMPLATE

JANUARY 25, 2005

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FOREWORD

Strategic planning in government has long been synonymous with budgeting. In effective organizations, planning and strategy guide budget requests, not the other way around. Planning allows programs to undertake situation assessments, implement decision making processes, prioritize resource allocation, and develop a performance management strategy.

Planning allows programs to link performance to the budget process, an expanding requirement within the budget process itself. With adequate planning, a program clearly defines the relationship between resource allocation decisions and the expected outputs of funded activities. A good strategic planning process communicates value to stakeholders, adjusts strategies over time, provides public sector accountability, and implements a value-oriented strategy rather than solely operation planning.

The purpose of this multi-year program planning template (Template) is to provide a general framework and specific best practice model references for the development of individual EERE multi-year program plans (MYPPs). The Template provides information on well-designed MYPPs through general guidance, examples drawn from existing plans, best practices, and definitions of commonly used terms.

It is understood that EERE programs need flexibility in developing their MYPPs. On the other hand, flexibility must be balanced with the need for consistency across EERE that enables the reader to understand how the programs are unique parts of an integrated organization.

As well, EERE senior management recognizes that the EERE programs are in various stages of MYPP development. For some programs, the Template will provide a much-needed blueprint for creating an important resource that affects most of the program's processes. For other programs that have traveled farther along the planning road already, the Template may serve as a reassurance of and check against completed work.

Planning is an integral part of good management. There are a number of external and internal drivers that are directly focused on the need to develop detailed, resource loaded multi-year plans. Some essential drivers include the Government Performance and Results Act (GPRA), which calls for the linkage of budget requests to strategic plans; the President's Management Agenda (PMA) and the OMB Program Assessment and Rating Tool (PART), which call for program justification with performance goals, funding links to activities, established milestones, progress measurements, and end points; the Department's CFO office, which has increasingly used program plans to make budgetary decisions; and the Congress, which has called for detailed five-year budget submissions with resource requirements explicitly expressed. These drivers are all expressions of the increased need to integrate planning as a function of the day to day management of Federal programs.

USER'S GUIDE

This Template attempts to make the task of writing a MYPP as straightforward as possible:

LEFT-HAND pages include instructions by section along with color-coded text boxes.

The corresponding RIGHT-HAND pages feature examples, when available, from EERE MYPPs.

Key Components

Best Practices

Terminology

BA Support

Graphics

QUICK REFERENCE

Program Name:

Program Manager:

Communications Lead/Contact:

Contact Information:

Legislative Authority:

FY 2005 Budget Authority (by Committee):

Number of FTEs:

Program Structure:
(graphic or list of subprograms)

MULTI-YEAR PROGRAM PLAN TEMPLATE: AT A GLANCE

This Multi-Year Program Plan Template provides guidance to EERE programs on developing effective program plans. The template is laid out in the following order: Introduction, Program Overview, Program Critical Functions, Technology Research & Deployment Plan, Program Administration, and Resource Allocation Plan. A brief overview of what should be included in each of these core elements of a multi-year program plan is summarized below.

Introduction: Program Manager's Outlook

This section provides an opportunity for the Program Manager to provide his or her outlook for the next five years and beyond. The introduction should focus strongly on the *external context* of the program. The Program Manager may provide his or her impressions of the plan itself, as well as address issues that do not fit well into the template format or that deserve special emphasis. This introduction should be less formal in tone than the remainder of the document, and is anticipated to be a page or two in length.

Section 1: Program Overview

The Program Overview provides an introduction to the program, including an examination of the external context in which the program operates, the program's history, and reason for funding a Federal program in this area, as well as the program's mission, vision, goals, outputs and outcomes of the program. Also included is a description of the market in which the program operates. A successful Program Overview section should set the stage for a more detailed examination of the program's internal processes in Section 2.

Section 2: Program Critical Functions

This section provides a description of the program's functional structure, as well as of the critical functions of the program. Critical functions include portfolio decision making, performance measurement, analytical processes and program evaluation. Program benefits are also described. These critical planning functions are supplemented and supported by the administrative and supporting matters discussed in Section 4.

Section 3: Technology Research and/or Deployment Plan

This section presents the technical plan for both R&D and deployment programs. There will be a separate technical plan for each program "element," (such as Concentrating Solar Power), as the level of detail of this MYP shifts from the program to the element level. The details of each program element will be examined as if each were a separate program, with goals, approaches, markets, challenges and barriers, and the related tasks, milestones and decision points for each element. This deeper examination is especially helpful to those programs whose activities range across a wide variety of areas and who find it difficult to "roll up" activities into broad, program-level descriptions.

Section 4: Program Administration

The final section of this document contains information on how the program is administered in an efficient manner. This includes a description of the structure of the organization, program implementation, cost management and monitoring, environmental safety and health, and communications and outreach efforts. As compared to Section 2, this section deals primarily with administrative matters that are not essential to the strategic or decision-making processes, but rather support the organization itself (such as cost management) and are therefore necessary to the success of the program and its multi-year planning.

Appendix 1: MYPP Drivers

Appendix 2: Glossary

Appendix X: Resource Allocation Plan (For EERE Internal Use Only)
This Appendix includes the five-year projection of resources (budgetary and staffing) required by the program to achieve its goals as stated in its MYP. OMB will provide EERE with an overall budget constraint. After Presidential priorities are addressed, the remaining funds will be allocated based upon senior management priorities. It is recognized that all programs will not be allocated enough funding to achieve all of their stated goals in FY 2007-2012 and beyond. Thus, it is critical that the plan articulates how significant program priorities will shift over time. It is imperative that the multi-year budget AND the multi-year goals are consistent as the program's performance will be evaluated on this basis.

INTRODUCTION: PROGRAM MANAGER'S OUTLOOK

This section provides an opportunity for the Program Manager to provide his or her outlook for the next five years *and beyond*. The introduction should focus strongly on the *external context* of the program. The Program Manager should provide his or her impressions of the plan itself, as well as address issues that do not fit well into the template format or that deserve special emphasis. This introduction should be less formal in tone than the remainder of the document, and is anticipated to be a page or two in length.

Key Components

- How do you (as a Program Manager) see the next few years for your program?
- Summary of challenges.
- Description of and comments on the program's external environment.
- Exciting new developments anticipated.
- Description of the assessment which sets the context for mission and strategic goals.

Best Practice: This introduction may best be written last, after the Program Manager has reviewed the program's otherwise completed MYP.

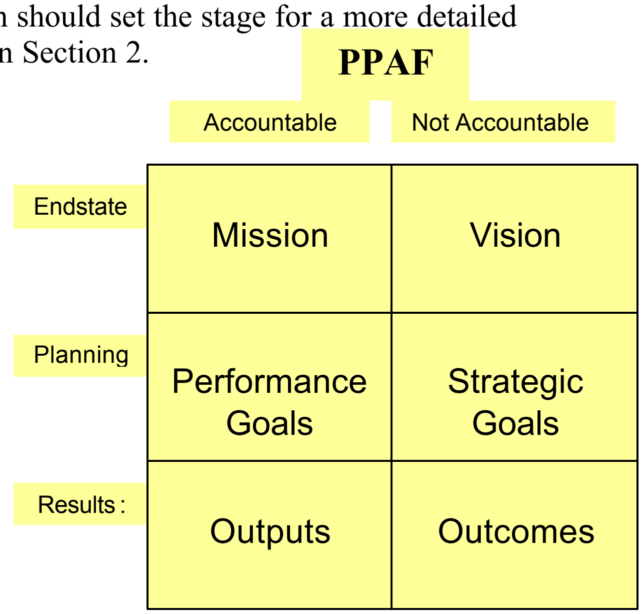
Example: (partially addressed)
Freedom CAR & Vehicle Technologies Program

The FCVT goal meets a national need: reducing our dependence on imported oil. Government and industry are partnering to develop advanced vehicle technologies. The barriers, both performance and economic, have been identified and goals and technical targets established. The R&D process to manage the technology development uses established approaches to increase the probability of success. However, because the government is not involved in commercialization of the technologies and does not conduct research on near-term applications, which are the purview of industry, the government R&D is concentrated on high-risk, long-term technology development. Nevertheless, the pursuit of cleaner, more-efficient vehicles today and emissions-free, petroleum-free vehicles tomorrow is a national goal set by President Bush and is important to the nation's energy, environmental, and economic future. The research agenda in this plan leads to this vision of the future.

SECTION 1: PROGRAM OVERVIEW

The Program Overview provides an introduction to the program, including an examination of the external context in which the program operates, the program's history, and reason for funding a Federal program in this area, as well as the program's mission, vision, goals, outputs and outcomes of the program. Also included is a description of the market in which the program operates. A successful Program Overview section should set the stage for a more detailed examination of the program's internal processes in Section 2.

A helpful tool for explaining the relationship between various aspects of the program covered in this Section is the **Program Performance & Accountability Framework (PPAF).** The PPAF visually lays out the mission, vision, performance goals, program strategic goals, outputs and outcomes of the program, as well as many of the relationships between them. The PPAF also delineates between aspects for which the program is accountable through performance measurement and those that are outside of the program's control. As a visual cue, the PPAF will be used throughout Section 1 and Section 2 with boxes shaded in yellow to indicate the area each subsection is covering.

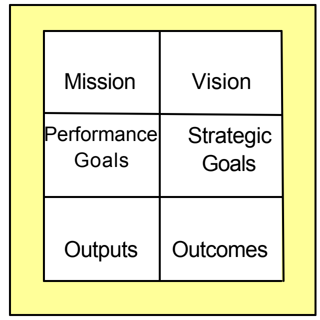


GRAPHIC: The **Program Planning & Accountability Framework (PPAF)** visually demonstrates the relationships between critical components of program planning. It is intended to assist personnel in understanding the relative positions and linkages between program planning components.

Internal processes (mission, goals, and outputs) for which the program can be held accountable are shown in the **left column**. External processes (vision, strategic goals, and outcomes) that are part of the program's planning processes but for which the program is not ultimately accountable are shown in the **right column**. The PPAF shows how outputs align with goals, and with the mission, while outcomes align with strategic goals, and with the vision. The parallels between the mission and vision, goals and strategic goals, and outputs and outcomes are also demonstrated.

The PPAF symbol will be used throughout this template as a reminder of how certain sections of the MYP relate and integrate with one another. When a particular template subsection addresses part of the PPAF, the corresponding box or boxes are shaded in yellow. The PPAF is not intended as a model that the programs must use or follow, but rather as a helpful visual for demonstrating relative positions and relationships of critical planning components.

1.1 External Assessment and Market Overview



This subsection provides the business context in which the program operates. Discussion should include a *broad* overview of: the market, national and state political environment, and international situation. Include a brief description of market barriers that occur at the *program* level. This allows the program to address *external* issues that help to explain the program rationale (below in Section 1.3) and that influence program strategy. Internal program design should not be discussed here, but rather in Section 2. A brief rationale for targeting particular market segments may be provided. Details of barriers that affect specific technologies, as well as the program's strategies to overcome them, will be addressed in Section 3. In terms of the PPAF, this subsection addresses the environment outside the PPAF framework itself.

Key Components

- Overview of current & potential markets.
- Overview of state, local and international political environment.
- Description of competing technologies.
- Overview of market barriers at the program level.

BA Support

BA can provide market research based on program needs. Market research conducted by BA across EERE ensures that all programs are using the same market assumptions and data.

Example - Current & Potential Markets:

Solar Energy Technologies Program (excerpt)

The existing solar industry has experienced steady growth throughout the past decade, but has achieved only a fraction of its potential toward solving our nation's energy problems. Since the 1970s, when the solar-energy market was virtually nonexistent, the business of solar energy has realized 100-fold price decreases, resulting in the production of millions of watts per year and achieving multibillion-dollar markets. The current U.S. solar industry employs some 20,000 men and women, representing about 300 companies, universities, and utilities. The companies range from small-installation contractors to large multinational corporations. These companies have recognized the growing market for solar energy and are investing millions of dollars to increase their market share by diversifying product lines and improving product performance.

PV cells and modules and solar-thermal collectors primarily define the current state of solar manufacturing in the United States. The solar industry is growing: according to the Renewable Energy Annual 2001, published by the Energy Information Administration (EIA), solar-thermal collector shipments surged 34% in 2001 to 11.2 million square feet. . . .

Alongside the growth in solar-thermal technologies, PV markets continued to grow. EIA reports that overall PV shipments increased 11% in 2001 to almost 98 peak MW. . . .

Although the growth in the solar industry is impressive, several barriers are keeping the industry from reaching its potential. First, despite impressive cost reductions over the last few decades, the cost of solar systems remains higher than traditional energy alternatives. But unlike coal or natural gas, solar energy's cost is not dependent on resources typically located far from generation or refinery facilities, but rather, on technical and cost limitations of existing materials and systems. Solar energy systems are capital intensive, while the cost of the primary energy resource is free. New generations of solar technologies will improve conversion efficiencies, reduce manufacturing cost, and improve systems integration that will drive the market growth and rapid expansion in the solar industry.

A second barrier to expansion of the solar industry is the lack of private-sector R&D investment. The immature industry does not yet generate profit margins large enough to allow for significant reinvestment. For example, one of the leading manufacturers of PV cells spent only 7.6% of its sales revenue on product development. Relative to other industries, such as the pharmaceuticals industry where companies spend an estimated 17% of sales on R&D, the solar industry relies on the Federal government and public-funded university programs for the bulk of R&D on new technologies and materials. Other non-technical barriers have stymied the growth of solar energy. Institutional barriers, including the lack of interconnection standards for distributed energy and net-metering provisions, are hindering market adoption. Furthermore, the air-quality and economic benefits of solar energy are not part of the complicated rate calculus of traditional electricity regulation. Overcoming these, in parallel with technology improvements, will be critical to significant market adoption.

1.2 Internal Assessment and Program History and Progress

Mission	Vision
Performance Goals	Strategic Goals
Outputs	Outcomes

As a corollary to subsection 1.1, this subsection provides a short history of public efforts in this area, including any public efforts undertaken in this area prior to the formal creation of this program. The description should show the program's current year efforts in the context of its history as well as highlight major element past accomplishments. In terms of the PPAF, this subsection covers the historical formation of the entire current program framework.

Key Components

- Brief history of program, including inception date.
- Major program accomplishments.

Best Practice: EERE programs are pursuing research opportunities that extend beyond the planning horizon contained in the plan. Most programs have pre-existing activities that precede the current planning period (usually the current execution year plus the next five fiscal years). Many plans also have goals which extend well beyond the scope of the program plan. As such, the program plan only provides a snapshot of the program at any point in time.

A good program plan not only reflects what the program hopes to accomplish (activities) and where it wants to be (goals), but also the baseline for targets and goals, and the current status along the path towards achieving those goals. Additional elements of a good plan are identification of past accomplishments and progress towards goals, or lack thereof. The baseline and the status of all key milestones (decision points), both past, present, and future, should be documented.

Example – Program History
Wind Energy Technologies Program (excerpt)

The Federal government has been sponsoring wind systems research since 1972. The early program, at the National Science Foundation, was driven by the needs of electric utilities and by the potential of wind as a "fuel saver" during the oil crisis. This utility focus led to a program to develop large-scale wind turbines. Other elements of the early program included technical and market analysis, environmental impact assessment, innovative systems design, vertical axis wind turbine development, and rural applications. The program also provided design review and testing for small turbine manufacturers.

At that time, analysts believed that large turbines had a strong potential for economies of scale, that energy production would be increased by tapping the better resources accessible using taller towers, and that utilities would primarily be interested in larger-sized units. When the program began, the feasibility of using large wind turbines (defined as turbines rated at 100 kW or larger) for grid-tied generation had not been established. The Mod-0, installed in 1975, and its variant, the Mod-0A, a 100-kW turbine that was operated at four sites, proved the feasibility of large turbine technology and provided a test bed for further innovation. The first megawatt-scale wind turbine, the Mod-1 (1979-1980), generated annoying noise, leading to research into noise mitigation. Three Mod-2 turbines, rated at 2.5 MW each, were deployed from 1980-1986. These turbines demonstrated several design innovations, but also experienced loads and stresses that were far above those originally anticipated. The 3.2-MW Mod-5B, the largest and last turbine in the series, corrected the significant design shortcomings of the Mod-2 machines and passed its acceptance tests in 1988, but never achieved commercial acceptance, in part because of the unfavorable market conditions created by low oil prices. While these large turbine designs were never deployed commercially, this research identified the limitations of early design approaches and helped define the scope of subsequent research and development efforts.

Other notable program work in the late 1970s and early 1980s included: the development of a National Wind Atlas that is still in use today, in updated form; initiation of airfoil research that reduced sensitivity to fouling, which was a problem with blade designs using aircraft airfoils; and work on improved materials and structural designs that has developed into an extensive knowledge base used by today's designers. That early work also began to define the somewhat unexpected complexity of the wind inflow, and to identify ways to mitigate its negative effects on turbine reliability and lifetime. . . .

The Advanced Wind Turbine (AWT) Program was initiated by the Department of Energy in 1990 to assist the U. S. industry in incorporating advanced technology into its wind turbine designs. . . .

The industry-driven strategy that was implemented in the early 1990s laid the groundwork for today's R&D program. It began a series of program-sponsored efforts to work closely with industry to develop wind turbines that are significantly more cost-competitive than their predecessors.

1.3 Program Justification & Federal Role

This subsection explains why the Nation needs this Federal program.

Key Components

- Description of the national need this program addresses.
- Why should the Federal government address this need instead of States, associations or industry?
- What is unique and critical about this program? Why should Federal dollars fund this program to address the national need, rather than other programs?
- What other Federal programs does this program complement?

1.4 Program Vision

Mission	Vision
Performance Goals	Strategic Goals
Outputs	Outcomes

This subsection outlines the program's vision. A clear, cohesive, and concise vision statement is critical for determining the scope, direction, and rationale for the program. The vision flows down into the program's strategic goals and its outcomes. The vision is, by its nature, at least in part, external to the program; i.e., the program itself cannot achieve the vision alone.

A **vision** statement describes the desired future state of the market and society that the program intends to help achieve.

Clear, comprehensive, and cohesive vision and mission statements are critical for determining the scope of the program, its direction, and to allow for a rational defense of the program. Vision statements describe the future desired state of the market, technology, or program while mission statements identify the program's role in achieving the vision's future state. The EERE corporate vision and mission are foundational and links and program are encouraged to form links to the corporate vision and mission. Specific EERE goals can also form the building blocks of a program mission and vision statement. However, it is recognized that the programs should and probably will want to tailor the mission and vision statement to the particular target market. A well formulated vision provides the basis for developing strategies and identifying actions within those strategies to help the organization reach its desired future state.

Example – Federal Role: (partially addressed)
Industrial Technologies Program

Many of the benefits of saving energy in industry accrue to society rather than to the organization that makes the investment. These social benefits include enhanced energy security, reduced dependence on foreign energy sources, and avoided emissions of NOx, CO2 and other pollutants. Companies have less incentive to invest in these technologies because they cannot capture all the benefits.

Companies in energy-intensive industries produce commodities and operate on low profit margins. As a result, these industries have much lower rates of R&D spending than other industries. In addition, this spending will be used to address numerous company priorities, only one of which is increasing energy savings.

A portion of a company's budget will be spent on developing technologies to comply with environmental or safety standards. This portion of R&D research is non-discretionary, because it is necessary for regulatory compliance.

Of the discretionary R&D, a company will prioritize R&D based on the project's expected return on investment. Investments that will increase capital or labor productivity, or that improve product quality, typically have the highest returns on investment. On the other hand, R&D projects that save energy typically have lower returns on investment, and will therefore be less likely to be funded.

Government support of R&D for energy savings technologies lowers the cost of investment for individual companies, and thus helps correct for their under-investment in these technologies. Furthermore, the convening power of government allows firms to collectively share information about technical barriers and solutions, as well as fund R&D programs that can spread the costs among several industry players. Through government sponsored R&D on technologies that reduce energy consumption, America will be able to reap the social benefits of reduced pollution, decreased dependence on foreign energy sources and increased energy security.

Examples - Vision Statement:
Industrial Technologies Program

Working in partnership, ITP strives for a world where U.S. industry produces goods of extraordinary quality with minimal energy and environmental impact. By promoting high-yield manufacturing, product durability and recyclability, the U.S. industrial base will be recognized for sustainability. Furthermore, production will be carried out using the most advanced technologies and practices to ensure that American workers have the tools and the skills to sustain our nation's continued economic vitality and energy security.

1.5 Program Mission

Mission	Vision
Performance Goals	Strategic Goals
Outputs	Outcomes

This subsection outlines the program's vision and mission statements. A clear, cohesive, and concise mission statement is critical for determining the scope, direction, and rationale for the program. Looking at the PPAF, the mission is clearly in the program's area of responsibility. The mission is the ultimate objective that the program is designed to achieve and is capable of achieving.

A **mission** statement is the charter of the program and provides the basis for all subsequent planning activity. It should be straightforward and succinct as well as descriptive of the program's core competencies. The more explicit the mission, the better positioned a program is to develop, clear, targeted program strategic goals. An explicit mission communicates a public image to important stakeholder groups and succinctly answers:

- What function does the program perform?
- For whom does the program perform this function?
- How does the program perform this function?

A well formulated mission statement should describe what the organization does and for whom. Ultimately, it defines why the organization exists. The mission clearly states what function the organization performs (develop technologies, techniques and tools), how (research, development, demonstration, and technology transfer), and why (make buildings more energy-efficient, productive and affordable).

1.6 Program Approach

This subsection describes the chosen approach, or course of action, of the program to achieve its mission.

Key Components

- What is the program's approach (e.g., long-term R&D, deployment) to achieving its mission?
- Explain why this approach is the most effective to fulfill the program's mission and address the national need? (provide supporting references, if any, such as a peer review)

Examples - Mission Statement:
Industrial Technologies Program

The Industrial Technologies Program seeks to improve the energy intensity of the U.S. industrial sector through a coordinated program of research and development, validation, and dissemination of energy efficiency technologies and operating practices.

ITP partners with industry, its equipment manufacturers, and its many stakeholders to reduce our Nation's reliance on foreign energy sources, reduce environmental impacts, increase the use of renewable energy sources, improve competitiveness, and improve the quality of life for American workers, families, and communities.

Building Technologies Program

The mission of the Building Technologies Program (BT) is to develop technologies, techniques and tools for making residential and commercial buildings more energy efficient, productive, and affordable. This mission involves research, development, demonstration, and technology transfer activities in partnership with industry, government agencies, universities, and national laboratories. The portfolio of activities includes efforts to improve the energy efficiency of building components and equipment and their effective integration using whole-building-system-design techniques. It involves the development of building codes and equipment standards. It also involves the integration of renewable energy systems and other advanced technology, including distributed energy technologies in Combined Heat and Power (CHP) applications, into building design and operation.

Example—Program Approach:
FreedomCAR and Vehicle Technology Program

The U.S. government primarily supports “basic” R&D, because it is typically less attractive to private industry because of the higher risk of failure and the longer payback periods involved in turning the fewer successes into marketable technology. However, there are times when national needs provide a compelling case for the government to support “applied” R&D, which typically has technological payoffs that are more immediate – the need for energy security and the risk of global climate change are two good examples.

1.7 Program Performance Goals

Mission	Vision
Performance Goals	Strategic Goals
Outputs	Outcomes

This subsection outlines the program's performance goals and demonstrates their linkage upwards with Administration goals and the program mission while establishing a connection to program outputs (to be discussed in more detail in Section 1.9). Developing goals is a process towards defining the results the program intends to achieve over time. Performance goals are often the most visible and critical part of the program's planning process. Without proper performance goals, the program will be unable to link performance with resource allocation and ultimate mission success.

Key Components

- Program performance goals
- "Goal Cascade": graphically show linkage from the National Energy Policy down through Department goals and EERE goals to the program goals.

Performance Goals listed here should include the annual targets stated in the budget submission and in Joule. They should set a target level of performance over time expressed as a tangible, measurable objective, against which actual achievement can be compared, including a goal expressed as a quantitative standard, value or rate. A performance goal is comprised of a **Performance Measure** with **Targets** and timeframes. Performance goals are output-oriented and more near-term, while strategic goals are

Best Practice: The DOE Office of Management and Evaluation (ME) has developed the following checklist of goal characteristics that help to ensure that goals are properly developed to meet a variety of planning and performance needs:

- Meaningful and Relevant
- Quantifiable
- Measurable
- Auditable
- Precise and Accurate
- Easily Understood
- Baselined

Example - Program Performance Goals:

Hydrogen, Fuel Cells & Infrastructure Technologies Program (excerpt)

Success for the HFCIT Program is defined as validation, by 2015, of technology for:

- Hydrogen storage systems enabling minimum 300-mile vehicle range while meeting identified packaging, cost, and performance requirements.

Solar Energy Technologies Program

Develop thin-film PV modules with a 11.5-percent conversion efficiency that are capable of commercial production in the U.S.

Program Performance Goals (continued)

Best Practice: In order to form a good planning basis, goals need to be clear, comprehensive, measurable, and verifiable. Goals should be set relative to an established baseline and have clear time frames, targets, and end points. The narrative accompanying these goals should describe how and, better still, how much the program contributes to achieving the stated vision (relative to other parties collaborating with the program).

Performance measures (both a metric and a target) and a baseline against which to measure are essential to assessing progress against a plan. A good plan will allow performance to be measured at several levels throughout the plan (Goals, Outputs, and Milestones). In the ideal, a target would include ranges which can be associated with "complete", "partial", or "unsatisfactory" levels of accomplishment. Further, the measures should be trendable with reporting at intervals that make sense vis-à-vis what is being measured and how often (quarterly, semi-annual, annual). These performance measures can be technical targets (by date certain) or other, trendable measures.

Performance needs to be measured against a baseline. The baseline is fixed to a given year and performance value and becomes the benchmark from which progress with research and deployment is measured. A sound planning practice will keep the program attuned to changes in the baseline so that underlying assumptions are continuously reevaluated and tested.

Best Practice: The rationale for the program, and the program plan itself, are strengthened to the extent that a strong linkage can be demonstrated to higher level goals within EERE and the Department. A good program plan will show a logical flow throughout that connects higher level goals (e.g., NEP, DOE and EERE Strategic Plans). The relative contribution of the program to these higher level goals, through quantification and measurement, is a sign of a well developed planning process.

As a program plan cascades into greater detail, a good program plan will maintain this linkage so that goals within the plan are directly related to individual activities, outputs, and milestones. Ideally, the performance metrics contained in the plan can be readily adapted to external performance measurement systems and the budget request and in fact correspond. In a well documented plan, this linkage should be plain to the casual observer.

Best Practice: EERE encourages the use of performance goals (outputs) over the use of market price/cost goals, since performance is within the control of the program while cost is not. Cost (modeled or actual market) is a useful unit to include in **program strategic goals**, covered in Section 1.8**.** Costs have many embedded assumptions, such as production scale, labor costs, learning, and inflation, over which EERE has no control and therefore should not have accountability. The PPAF is visually useful for understanding and explaining how costs are better as program strategic goals, which lead to outcomes and can serve as the basis for important indicators or trends of program success or failure, but which are outside of the program's ultimate control. For instance, costs are useful for the program to track to determine the course of the markets and the overall direction of the program toward reaching its vision, but the program should not be held responsible for controlling the market, a responsibility inherent to cost measures. It is recognized that cost targets are sometimes critical to show performance improvements, but for the reasons stated above cost targets are more valuable as indicator measures. Some programs, like the Hydrogen program, may have a more difficult time others in moving away from cost goals that have received high visibility. Such programs are encouraged to leave current high-profile cost goals in place but not to develop any new cost goals.

Examples - Goal Cascade:
Industrial Technologies Program

Weatherization and Intergovernmental Program

WIP goal is to accelerate the adoption of clean, efficient and domestic energy technologies through efficient intergovernmental demonstration and delivery of cost-effective energy technologies that will benefit the public through improved energy productivity and reduced demand and particularly reduce the burden of energy services on the disadvantaged.

- Advance the presidential commitment to increase funding for Low-Income Weatherization by $1.4 billion over 10 years and weatherize 1.2 million homes by 2010.

1.8 Program Strategic Goals

Mission	Vision
Performance Goals	Strategic Goals
Outputs	Outcomes

This subsection outlines the program's strategic goals that may be outside the scope of the program's control, but may still be critical to achieving the program vision. It is important to note the connection between the program *vision* and the program *strategic goals*. Remember, that the program cannot be held accountable for the ultimate achievement of these strategic goals; their success depends on other factors, such as market acceptance, consumer compliance, other agency actions, or State involvement, to name a few.

Program strategic goals should be not be confused with *DOE and EERE Strategic Goals,* which inform the development of program level goals. For example, the *EERE Strategic Goal*, to "dramatically reduce, or even end, dependence on foreign oil," could lead to a *program strategic goal* to "reduce petroleum consumption in cars and trucks." The *program performance goal* would then focus on how those strategic goals would be met through program action, such as to "increase the efficiency of a hybrid drive by X percent."

Program Strategic Goals- are outcome-oriented, broader than performance goals and contain elements that are beyond the program's control. They may contribute significantly toward achieving the endstate described in the vision, and program outcomes flow up to these goals. Program *performance* goals, on the other hand, are output-oriented and within the program's control to achieve. Program outcome goals should relate to and in the aggregate be sufficient to influence the strategic goals and their corresponding performance measures.

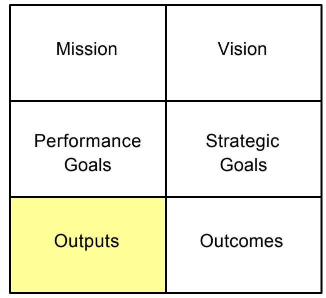
Example—Program Strategic Goal

Increase the use of renewable energy in the United States.

Lower health costs caused by poor air quality in the United States.

Reduce petroleum consumption in cars and trucks.

1.9 Program Outputs



This subsection describes in detail the anticipated major outputs at the program level on the way toward achieving program goals, and ultimately, the program mission. In Section 2, the measurement of these outputs is detailed under performance measurement. In Section 3, outputs are described at the technology level.

Key Components

- Anticipated major programmatic outputs, both in the 2007-2012 timeframe, and beyond.
- How do these outputs relate to the program goals?

Outputs: Outputs refer to the anticipated measurable results from *internal* program activities for which the program may be held accountable. Programs are expected to measure and monitor outputs on a regular basis.

Example—Program Output:
Wind Energy Technologies Program

The number of states with mature wind markets.

Solar Energy Technologies Program

Efficiency of a thin-film module.

1.10 Program Outcomes

This subsection describes in detail the anticipated major outcomes at the program level. In Section 3, outcomes are described at the technology level.

Mission	Vision
Performance Goals	Strategic Goals
Outputs	Outcomes

Key Components

- Anticipated major programmatic outcomes.
- How do these outcomes relate to the program vision?

Outcomes: Outcomes are results that are *external* to the program but that are of direct importance to the intended beneficiary and that contribute to the achievement of the program's vision. Outcomes are also useful trend indicators for the program to determine whether or not it is on course to reach its vision endstate.

Examples—Program Outcome
Wind Energy Technologies Program

The levelized cost of energy from wind power.

Solar Energy Technologies Program

Cost of power from a thin-film solar module.

Number of homes in the U.S. powered by PV. (not used)

SECTION 2: PROGRAM CRITICAL FUNCTIONS

This section provides a description of the program's functional structure, as well as of the critical functions of the program. Critical functions include portfolio decision making, performance measurement, analytical processes and program evaluation. Also described are the expected program benefits. These critical planning functions are supplemented and supported by the administrative and supporting matters discussed in Section 4.

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2.1 Program Structure

This subsection examines and justifies the current structure of the program.

Key Components

- Graphic of program structure.
- Why is this structure best suited to help achieve program goals?
- Discuss the interaction among program elements.
- Discuss the interaction with other EERE programs

Example—Program Structure:
Wind Energy Technologies Program
The Wind Program focuses on the dual elements, or Key Activities, of its mission – to increase the technical viability of wind systems and to increase their deployment in the emerging marketplace. Figure 7 shows that there are six sub-key activities in these two elements.

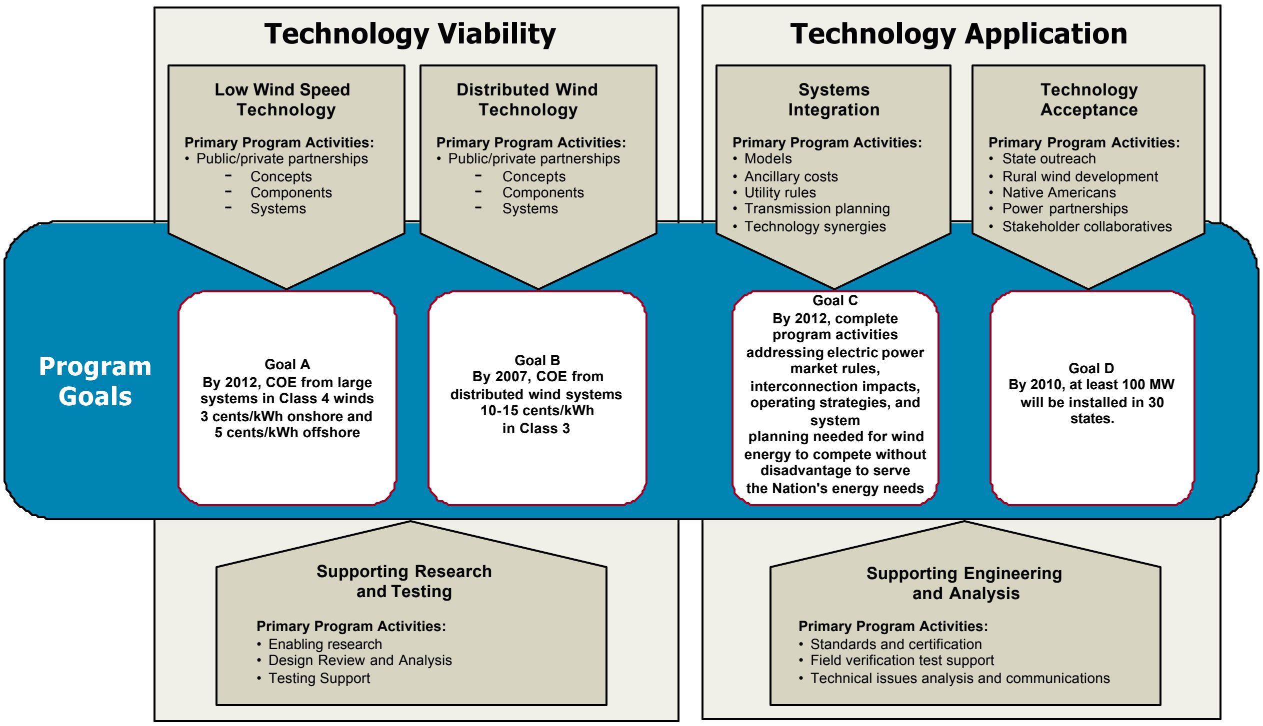

Figure 7. Wind Program Structure

2.2 Portfolio Decision-Making Process

EERE management is encouraging programs to use a systematic approach to the program's portfolio decision-making process. The information contained in this subsection is especially critical to a successful MYP and the eventual development of an EERE-Wide MYP. Programs are not restricted to using any one particular decision-making process, but should be able to explain the logic behind their process.

Key Components

- Describe the program's portfolio decision-making process.
- Provide a graphic demonstrating the decision-making process.
- How are returns on investment optimized?
- How are peer review and external feedback incorporated into the decision-making process?
- How is risk assessed within the program?

BA Support:
PBA is developing EERE corporate risk assessment guidance to be released in FY 2006. In addition, PBA can provide market research to inform program portfolio assessments.

Best Practice: There is more than one way of achieving a program goal. A good program plan will elucidate each alternative pathway, and the pros and cons of pursuing a particular route. With sufficient resources, a program may pursue multiple pathways, closing out these alternative pathways as critical decision points are reached and progress evaluated.

Planning is strengthened significantly as a well defined process is identified, and used, to select among these pathways. A good plan will document this decision process, including the criteria used to establish program priorities among competing needs, and tie each pathway to specific goals. Underpinning these decisions will be solid analysis which is thoroughly referenced in the plan. A good plan will show has this analysis was used to support the decision making process using the established criteria.

Along technical pathways, milestones can be established. Milestones are used to identify discrete accomplishments along the way towards a goal. Milestones are critical to determining program progress. A good program plan will have milestones which are timed, resourced, and tied to specific program goals. Such a plan will be able to demonstrate how acquisition of a milestone brings the program a step closer to achieving the goal.

A well-documented plan will present these milestones along a pathway in time. Critical decision points, or go/no-go decisions along each pathway provide an opportunity to reassess progress and continue or redirect resources along more successful venues. A stage-gated process, which distinguishes between phases of research, development, and deployment, can be used to identify these critical decision points.

Example—Portfolio Decision-Making Process:
Wind Energy Technologies Program

Figure 5 provides an overview of the program's strategic planning framework, which has two elements. First, the program has an on-going Technical Assessment activity – to monitor the current status of wind technology and progress in achieving program cost goals, to evaluate that status within the context of the needs of the marketplace, and to identify technological pathways that will lead to wind's successful competition in the marketplace. The program also uses a formal Peer Review process – to benefit from the guidance of industry and the research community, and to provide an outside view of the program. As shown in Figure 5, Technical Assessment and Peer Review provide inputs that the Program Management Team considers in making decisions about strategic program directions and funding priorities.

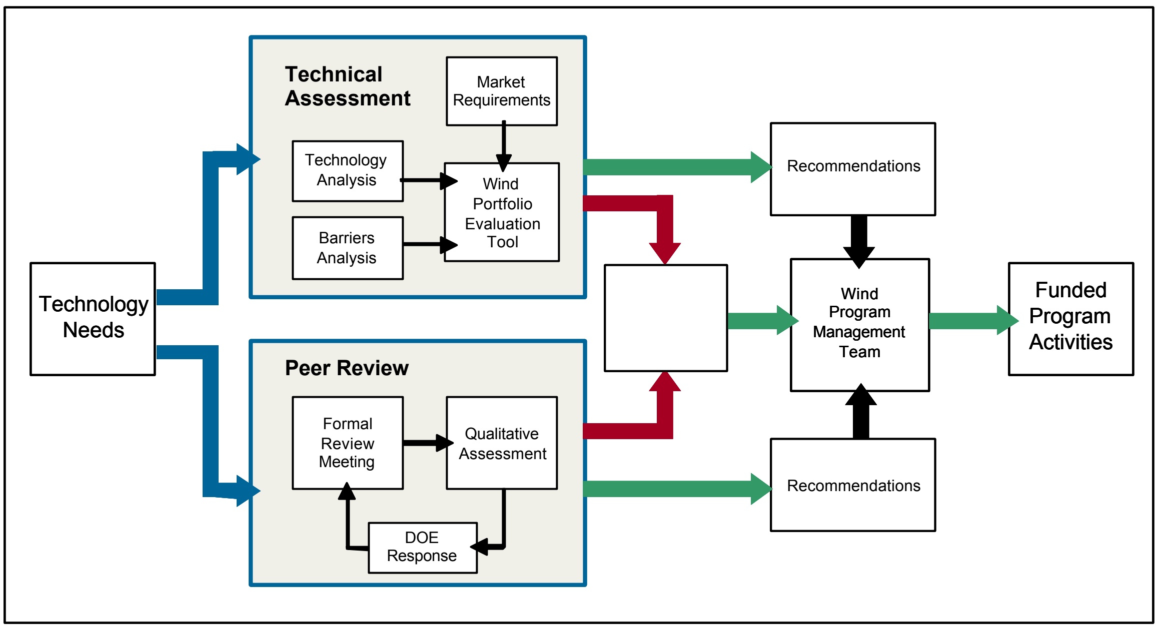

Figure 5. Strategic Planning Framework

Industrial Technologies Program

ITP currently utilizes the milestone planning process to provide planning structure for its current portfolio, and to assist in developing a vision for the future. The basic decision process is illustrated below in Figure 4d. The process begins with the consideration of the primary mission of EERE and the U.S. Department of Energy, and an understanding of how that mission fits within the planning, regulatory and budgetary framework faced by ITP. This is known as the mission logic. Combining that logic with an understanding of ITP's customers, ITP's R&D needs, and a firm understanding of the organizational strategy of ITP, the decision process then considers the needs of ITP's external stakeholders within the perspective of the program strategic goals of government. By balancing the needs and driving forces behind industry with the greater social good, priorities are set within the context of inherently governmental activities, resulting in the identification of technical program strategic goals that serve both a public and private need.

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Example—Portfolio Decision-Making Process: (continued)
Industrial Technologies Program

At the federal decision-making level, there is a translation of these various inputs into essential areas of R&D, represented by the technology focus areas that are identified in each industry and cross-cut planning unit. By narrowing the planning exercise to several high-level technology focus areas, it is possible to produce a basic milestone chart for each planning area, which essentially represents an opportunity analysis covering a 5-year period.

Each opportunity analysis/milestone chart is a balance of goals against achievable metrics. By taking into consideration the capacities and capabilities of government, including knowledge of people in the organization, dollar size of the investments ITP can make, and potential impact of investment decisions, the planning process supports better-informed decision-making within ITP.

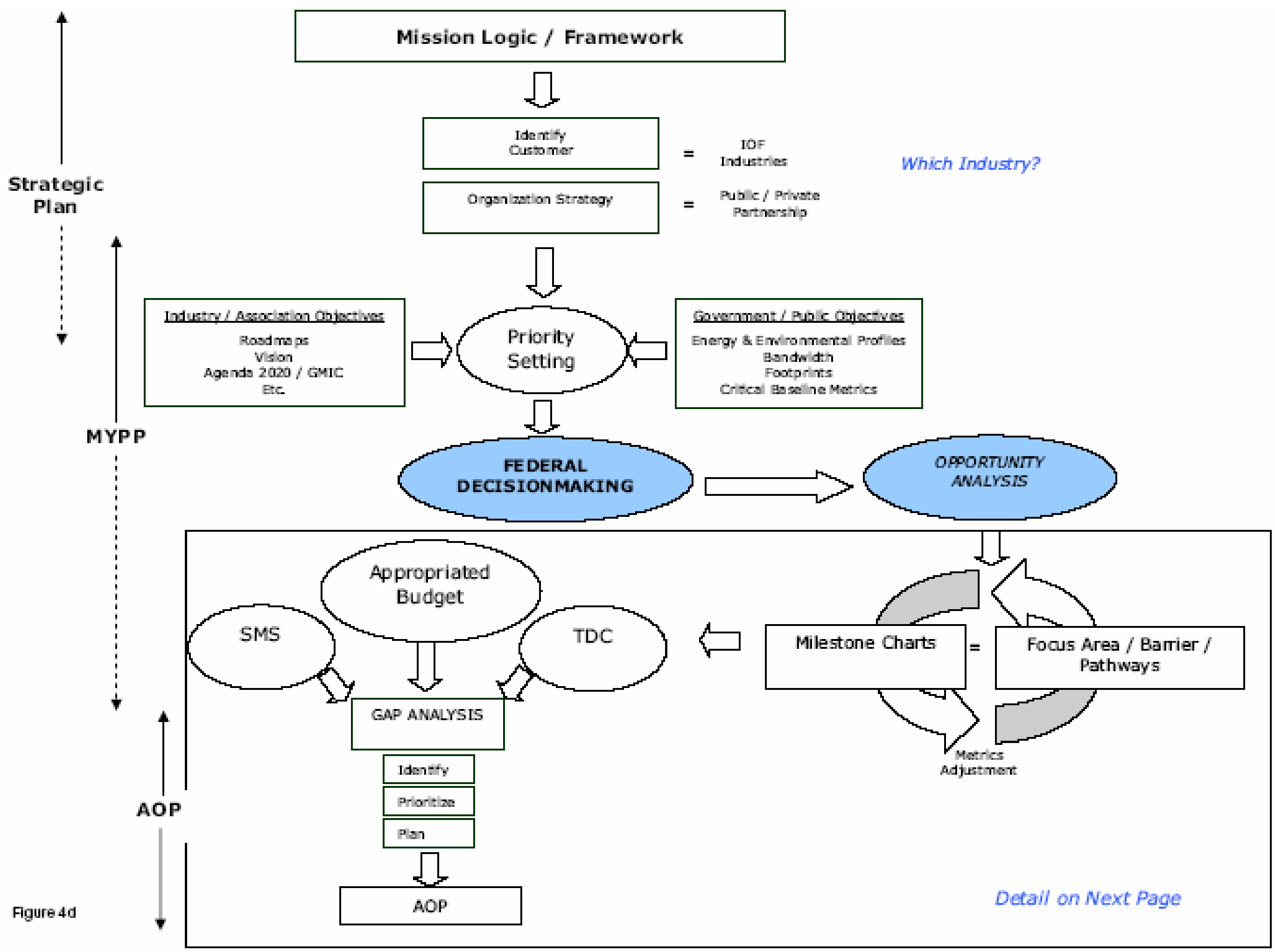

Figure 4d

2.3 Program Analysis

This subsection describes analytical activities conducted by the program. Programs can include a more detailed discussion of the analytical tools used to conduct portfolio analysis as described above in Section 2.1. Analytical tools, such as logic models, can successfully inform program investment decisions and help to efficiently allocate resources to meet program goals.

Key Components

- Describe any analytical tools (e.g., models) used by the program, especially those that assist the program in the portfolio analysis described in Section 2.1.
- Describe any analytical work (e.g., market studies, model development, benefits estimation, or policy analysis) sponsored by the program.
- How do these analyses inform the program's R&D and deployment decision process?
- Identify key assumptions (e.g., economic factors, energy prices, and technology assumptions) used in the analysis.
- List relevant analytical publications completed used to guide the analysis.

BA Support

BA needs analytical assumption information from the programs in order to develop consistent baseline data for program analytical activities. It is essential that programs work to develop strong documentation on the assertion of program benefits, statistical data, and the analytical foundations of the program's assumptions in accordance with BA guidelines.

Best Practice: The plan should be grounded in analysis. The rationale for selecting particular goals, the quantification of the impact of achieving the goals, the process used for identification and qualification of barriers, and the choice of strategies all need an analytical underpinning. This analysis should be provided in the open literature with a citable reference. Ideally, the analysis should be peer reviewed, with the ability to be confirmed or refuted.

The degree of analysis needs to be balanced with the size of the potential impact, the range of uncertainty, and the cost of obtaining the information. The program should describe how it will obtain all information needed for effective program planning as well as identify gaps in the analysis that will go unfilled.

Evaluation is a key part of any successful program. The MYPP should provide a clear discussion of the program's evaluation strategy, both for business measures, as well as for the technology development and deployment pathways. A separate EERE publication on evaluation guidance – "Peer Review Guide" and a second "Guide for Managing General Program Evaluation Studies" are available.

Example – Analytical Tools & Processes (partially addressed)
Biomass Program

Analysis infrastructure includes the resources (methods, tools, and analysts) to perform analysis for the Program. Maintaining these capabilities at the cutting edge is essential to ensure that the analysis provides the most efficient and complete answers to the technology developers and the Program. Analysis methods for biomass processes are as new as the processes themselves. Although some methods and tools from other industries (especially the process industries such as petroleum refining and petrochemical processing) can be used with modification, others, such as biomass physical property estimation methods, must be developed.

Coordination, development of new methods, and communication are the three pieces used to build the analysis infrastructure for biomass. Within the biomass scientific community, there is analysis at several levels with different methods. Developing partnerships in this community is key to ensuring the results are transparent, transferable, and comparable. Building an analysis infrastructure for biomass R&D improves the analysis value and efficiency, while eliminating redundancy and gaps. Efforts by the NBC to combine the former biopower and biofuels analysis capabilities and methodologies and align with the evolving HFCIT Program analysis group are complete. The next step is to develop similar alignment between the national laboratories in the NBC and the rest of the organizations performing R&D in support of OBP.

Multi-lab coordination plans include holding annual analysts roundtable meetings, standardizing methods, and developing Web-accessible tools, methods, data, and documents. Near- and mid-term new methods and tools development plans include training in the use of risk analysis for scientific processes, developing methods to track progress on all OBP projects, and continued pioneer plant analysis to understand first-of-a-kind risks in plant costs and performance for stakeholders. Efforts to improve communication of analysis results to DOE and stakeholders include improved understanding of EERE analysis methods, tools, and inputs; development of a MYPP; and creation of technology design reports that are crucial to specifying the technology baseline and technical targets on a program-wide basis.

Wind Energy Technologies Program

The technical assessment process ensures that every research activity supported by the program can be demonstrated to have a direct link to achieving the top-level program strategic goals and goals of the Wind Program, the Office of Energy Efficiency and Renewable Energy, and DOE.

The technical assessment effort is built around a Technology Pathways structure. In developing the focus on Class 4 resources, program researchers, technical consultants, and peer reviewers have defined a 2002 Reference Turbine configuration, against which R&D progress is being measured. This 2002 Reference Turbine is the beginning point for the pathways analysis and the reference point for the technical assessment activity. The Technology Pathways analysis structure is used to assess all program support for technology development, as will be described in Chapter 5.

The technical assessment process can be described as including three steps:

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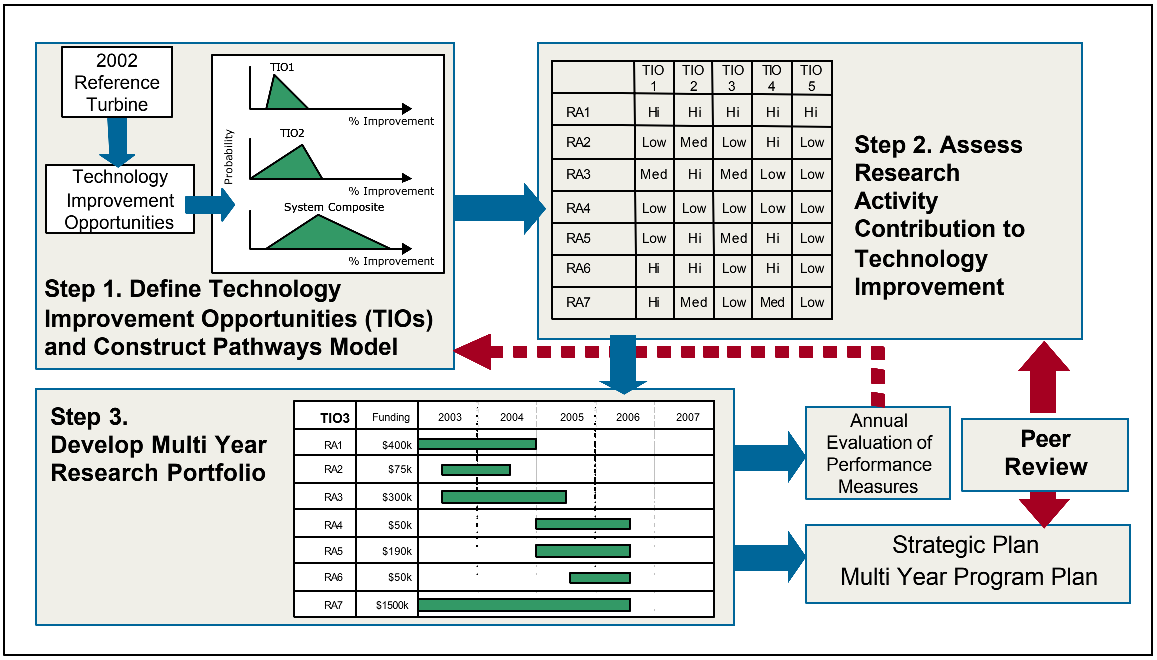
Example – Analytical Tools and Processes (continued from previous page)



	TIO 1	TIO 2	TIO 3	TIO 4	TIO 5
RA1	Hi	Hi	Hi	Hi	Hi
RA2	Low	Med	Low	Hi	Low
RA3	Med	Hi	Med	Low	Low
RA4	Low	Low	Low	Low	Low
RA5	Low	Hi	Med	Hi	Low
RA6	Hi	Hi	Low	Hi	Low
RA7	Hi	Med	Low	Med	Low

TIO3	Funding	2003	2004	2005	2006	2007
RA1	$400k					
RA2	$75k					
RA3	$300k					
RA4	$50k					
RA5	$190k					
RA6	$50k					
RA7	$1500k					

Figure 6. Technical Assessment Process

1. Characterization of Technology Improvement Opportunities – In this step, the program identifies areas of possible cost reduction or performance enhancement to the reference configuration, or Technology Improvement Opportunities (TIOs). Examples of TIOs include rotor efficiency enhancements, taller towers, and reduced design margins. These improvements are then further assessed, using the Wind Technology Pathways Model, to quantify their potential contribution to improving the technology's cost-effectiveness. Cost of energy is used as a focus for this analysis because it captures the capital investment cost and performance trade-offs facing turbine designers. Appendix A provides a detailed discussion of the Wind Technology Pathways Model.
2. Research Activity Prioritization and Performance Goals – In this step, program planners identify the research activities necessary to achieve the TIOs. Each research activity's potential contribution to technology improvement is identified. Research activities that contribute little to achieving technical targets (such as RA4 in the example figure) are terminated. Those contributing the most are given the highest funding and management priority.
3. Detailed Portfolio Planning – Finally, after developing a prioritized list of research activities, program planners then formulate the program's research plan over the planning horizon.

An important element of the Technical Assessment process is to perform annual assessments of progress toward program goals, and to incorporate peer review feedback into program prioritization activities. The analyses conducted under this Technical Assessment activity are also used in program estimates of annual benefits under the Government Performance and Results Act (GPRA).

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Example – Analytical Tools and Processes

Distributed Energy Program

The Distributed Energy Program (DE) multi-year plan includes a section on Analysis. The section is broken into several areas of need:

- Data
- Modeling
- Market Analysis
- Portfolio Analysis
- Policy Analysis

Within each section, a brief statements of the analysis need, and in many cases, how that analysis will be used. In some cases, the top priorities within each area of analysis are identified.

Hydrogen, Fuel Cells & Infrastructure Technologies Program

The Hydrogen, Fuel Cells & Infrastructure Technologies Program multi-year research, development and demonstration plan also has a section devoted to analysis and evaluation. The evaluation section, while brief, is thorough and describes a process for both program and project level evaluations. As noted in the plan, peer reviews are conducted every two years as required by EERE policy. Tasks performed by industry, universities, and national laboratories are evaluated annually at a Program Merit Review and Peer Evaluation meeting. The results of these reviews and evaluations are used to inform funding decisions for each task in the upcoming fiscal year. The plan includes an appendix with sample evaluation sheets and criteria.

The program also has a formal advisory committee. This committee reviews the program at semi-annual meetings and provides an assessment and recommendation directly to the Secretary of Energy. Finally, reference is made to internal evaluations by EERE management of budget performance, financial management, and overall program management.

As with the Buildings Technologies and other TD programs, the Hydrogen Program is adopting a systems integration approach to analysis. Such an approach allows the program to evaluate how the various technology pathways come together to achieve the overall goal of the program. The Hydrogen program presents a very thorough analysis approach within this systems integration context and describes, at each point, how the analysis will be used by the program to inform decision making.

2.4 Performance Measurement

This subsection should present the main performance measures used by the program to determine program progress. Measures should be consistent with the program budget as well as Departmental and Administration performance rating tools. *Measures should be output-based and directly aligned with the outputs listed in Section 1.9 and that may appear in a logic model (see Section 2.6).* In the Performance Accountability Framework, performance measurement is contained to the left column of internal program functions for which the program is ultimately responsible. The program should select measures that explicitly relate all the way from outputs to the mission. Programs should attempt to capture the essence of the program's full performance through a minimum number of representative measures.

Mission	Vision
Performance Goals	Strategic Goals
Outputs	Outcomes

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2.4 Performance Measurement (continued)

Key Components

- Provide a comprehensive list of program measures
- Tie measures to program goals.

BA Support

BA can assist the programs in the formation of program measures and the alignment of measures with internal and external performance rating tools and other requirements.

Performance Measure: Indicators, statistics or metrics used to gauge program performance.

Best Practice: Linked Performance Measures

Programs must ensure that their performance measures are linked to other deliverables, including Departmental and external performance tracking systems and budget text. There should be a logical flow throughout the Program Plan that demonstrates how the plan connects to higher-level goals (e.g., NEP, DOE and EERE Strategic Plans, and the Program's own strategic plan).

Best Practice: Performance measures should be --

- Meaningful and Relevant
- Quantifiable
- Measurable
- Auditable
- Precise and Accurate
- Easily Understood
- Baselined

Performance measures (both a metric and a target) and a baseline against which to measure are essential to assessing progress against a plan. A good plan will allow performance to be measured at several levels throughout the plan (Goals, Outputs, and Milestones). Ideally, a target would include ranges which can be associated with complete, partial, or unsatisfactory levels of accomplishment. Further, the measures should be trendable with reporting at intervals that make sense vis-à-vis what is being measured and how often (quarterly, semi-annual, annual). These performance measures can be technical targets (by date certain) or other trendable measures.

Graphic: Performance measures should be presented in tabular form showing actual data and projected targets for each metric. The period of time may vary for each metric but should include targets through 2012. Each measure should be linked to the appropriate program element. Where outcome measures are necessary, they should be separated from the output measures, as they are not performance *measures* but indicators for performance *monitoring*, as described in the below subsection.

Example- Program Performance Measures
Solar Energy Technologies Program

METRIC		2002	2003	2004	2005	2006	2007	2008	2009	2010
Outputs (recommended as performance measures)										
PV										
Efficiency of commercial crystalline silicon modules (%)	Actual			12.5						
	Target			12.5	13.5	14.0	14.5			16.0
Efficiency of commercial thin film modules (%)	Actual			10.0						
	Target			10.0	11.0	12.0	12.5			14.0
CSP										
Efficiency of CSP system (%)	Actual									
	Target									
SHL										
Durability of polymer materials for SWH (years)	Actual		7	13						
	Target		7	13	17	20				
Annual output of polymer SWH in non-freezing climates (kWh)	Actual									
	Target					1100				
Outcomes (not recommended for use in performance measures; can be used for performance monitoring)										
PV										
Manufacturing cost of PV modules ($/Watt)	Actual	2.25	2.10							
	Target	2.25	2.10	1.95	1.85	1.75				1.50
Cost of power from PV ($/kWh)	Actual		19-24	18-23						
	Target		19-24	18-23	17-22	16-21				12-17
CSP										
Cost of power from large-scale CSP plants ($/kWh)	Actual		0.14	0.12						
	Target			0.12	0.11	0.11				0.07
SHL										
Solar water heating costs in freezing climate ($/kWh)	Actual			0.10						
	Target			0.10	0.10	0.10	0.10	0.10	0.05	0.05
Solar water heating costs in non-freezing climate ($/kWh)	Actual	0.08	0.08							
	Target			0.07	0.05	0.04				

2.5 Performance Assessment

Mission	Vision
Performance Goals	Strategic Goals
Outputs	Outcomes

Performance assessment includes performance monitoring and program evaluation. Performance assessment provides the means through which a program can measure relevant outputs and outcomes that can aid the program in reevaluating its decisions, goals, and approach, and provide a sense of the real progress being made with the program's efforts.

Routine monitoring of performance against goals, along with in-depth evaluation of program rationale, process, impact, and cost-benefit serve two critical purposes – program improvement and accountability.

- Improvement: Help managers assess how well their programs are working by assessing the extent to which desired outcomes are being achieved and by identifying whether improvements are needed to increase effectiveness with respect to objectives.
- Accountability: Help program managers and others demonstrate internal and external accountability for the use of public resources, and better communicate the program's value to the public.

Key Components

- Description of the types of program performance assessments in EERE
- When to do performance assessments during a program's lifecycle
- Elements of a program-wide performance assessment strategy

Performance Monitoring: The ongoing monitoring and reporting of program accomplishments, particularly progress towards pre-established goals. Performance monitoring uses information on measurable outputs (and sometimes short-term outcomes) obtained from routine data collection activities to address the question -- "What has happened?"

Program Evaluation: Systematic studies conducted periodically or on an ad hoc basis usually by outside independent experts, to assess how well a program is working. Program evaluations address questions concerning program rationale, process, impact, or cost-benefit, and ask -- "How, who and why?" – using methods such as expert judgment (peer review), and general evaluation studies such as statistical sample surveys, case studies, experimental design studies, and bibliometrics.

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Program performance assessments in EERE

The basic types of performance assessments used by EERE programs are:

- ***Results-based performance reporting*** using DOE's Joule Performance Measurement Tracking System, R&D Investment Criteria, and the White House Office of Management and Budget's (OMB) Program Assessment Rating Tool (PART).
- ***Peer reviews*** by outside independent experts of both program and subprogram portfolios to assess quality, productivity, and accomplishments; relevance of program success to EERE strategic and programmatic goals; and management. [1]
- ***General program evaluation studies*** performed by outside independent experts to examine market needs/baseline, process, outcomes and impacts, or cost-benefit, as necessary. [2]
- ***Technical program reviews*** by EERE Senior Management, Technical Teams, or Advisory Committees

BA Support: BA can assist the programs in performance assessments by helping to develop well-defined performance metrics and indicators, assisting in preparing program-wide evaluation strategies, and upon request, working with programs to manage evaluation studies.

When to do performance assessments during a program's lifecycle

Performance assessments occur throughout the life cycle of the program, covering information needs of each major program element.

Whatever individual monitoring or evaluation activities a program conducts over its life cycle, it is good planning practice to describe the plan for program-wide performance assessments in the MYPP.

Elements of a program-wide performance assessment strategy

Ideally a program office should have a program-wide performance assessment strategy that addresses each program element, with a schedule of planned performance monitoring and evaluation activities and the resources set aside for them.

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[1] A separate guide on peer review is now available -- Peer Review Guide (August 2004).
[2] A separate guide on general program evaluation is forthcoming -- Guide for Managing General Program Evaluation Studies (forthcoming, February 2005).

PROGRAM LIFE CYCLE STAGES

Planning or early implementation stage	During program operations stage	End of program stage

Market/ Baseline Assessment: before the program is initiated.

Results-based performance reporting (quarterly & annual Joule; annual PART and CRB)

Peer reviews -- "All EERE programs and their key projects will be reviewed, on average, every two years, depending on the characteristics of the program and needs for information" [Source: EERE Peer Review Guide (August 2004) and Peer Review SOP]

General program evaluations -- There is no hard and fast rule on when to conduct general program evaluation studies (progress, outcome, impact, cost-benefit, or market needs/ baseline evaluations). The following are recommended times in a program's life cycle when it could benefit from a general program evaluation.

- **Process evaluation:** once every 2-3 years, or whenever a need exists to assess the efficiency of the program's operations.
  - **Outcome or impact evaluation:** once every 2-3 years, or annually if results are to be used to support annual GPRA benefits analysis or other data needs. Impact evaluation -- once every 3-5 years.
    - **Cost-benefit evaluation:** once every 3-5 years.
      - **Market Needs/ Baseline Assessment:** repeated as necessary to determine if there is a continuing need for the program's services, or for identifying new market segments to target.

Technical reviews by Senior Management, Technical Teams, or Advisory Committees are typically held annually.

Ex-post process, impact, or cost-benefit evaluation: Done 1-3 years after the end of the program.

The schedule would help ensure performance data is available when needed in the program planning cycle and well-timed to build upon and inform routine data collection, analysis, and benefits estimation. A good MYPP should include a section that describes a systematic plan for carrying out program-wide performance monitoring and program evaluation activities. Although details would be documented in a separate evaluation plan document, the MYPP should include an overview of the following:

Schedule and description of planned performance assessment activities, including how data on routine performance measures will be validated and analyzed.

- For the major evaluation studies, the decisions informed, and questions addressed along with criteria for answering the questions.
- Brief description of how data is to be collected and analyzed, such as use of peer review or statistical survey.
- Description of how the independence and quality of the evaluation process will be assured.

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Best Practice (performance assessment strategy):
(Hydrogen program example) --

The Hydrogen program employs a variety of different performance assessment activities.

Peer Review: Tasks performed by industry, universities, and national laboratories are evaluated ***annually*** at the Program Merit Review and Peer Evaluation meeting. An ***independent review panel*** reviews all tasks supporting each Project in accordance with criteria which ***helps guide DOE Technology Development Managers in making funding decisions***. Projects are evaluated based on the following criteria: 1) Relevance to overall DOE and Hydrogen Fuel Initiative objectives; 2) Approach to performing the research and development; 3) Technical accomplishments and progress toward project and DOE goals; 4) Technology transfer/collaborations with industry/universities/laboratories; and 5) Approach and relevance of proposed future research. The panel also evaluates the strengths and weaknesses of each project, and ***recommends additions to or deletions from the scope of work***. Each year the Program will publish the results and decisions from the Annual Merit Review and Peer Evaluation.

External review is also ***conducted at the program level***. Peer reviews conducted ***by the National Academies*** (e.g. National Research Council, National Academy of Sciences), or an equivalent independent group, will be carried out ***every two years***. A formal response to the recommendations from the NRC review is then prepared.

Market Baseline Assessment: ***For an education program to be effective, the knowledge baseline of the target audience has to be understood***. Thus, it is important to ascertain the familiarity of the population of the United States with hydrogen and fuel cell concepts. Evaluation activity for the education program will include a statistically designed survey of knowledge and opinions concerning hydrogen, fuel cells, and the hydrogen economy conducted on populations within the United States. Four target populations were selected to be surveyed: (1) the general public, (2) students, (3) personnel in state and local governments, and (4) potential large-scale end users of hydrogen fuel and fuel cell technologies in business and industry. The goal of the 2004 hydrogen surveys is a statistically valid, nationally based measurement of awareness and understanding of hydrogen, fuel cells, and the hydrogen economy for each of these target populations. The results of the 2004 surveys will be the baseline assessment. The same processes for conducting the survey in 2004 will be used in follow-on surveys in 2007 and 2010, and the same methods of data analysis will be used. These baseline results will be ***used to design a hydrogen education program*** for the public, teachers and students, state and local governments, and the community of potential large-scale users of hydrogen. Over time, when the surveys are periodically repeated, measures of changes in awareness and understanding will be taken, and this information will be used to ***modify the educational program as necessary.***

Technical Reviews: The Hydrogen Technical and Fuel Cell Advisory Committee (which will be established with approval of the Energy Bill) will review the Program at semi-annual meetings and provide an assessment and ***recommendation directly to the Secretary of Energy***. The FreedomCAR and Fuel Tech Teams also participate with DOE to perform additional reviews of DOE-funded national laboratory, university and industry projects at least once a year.

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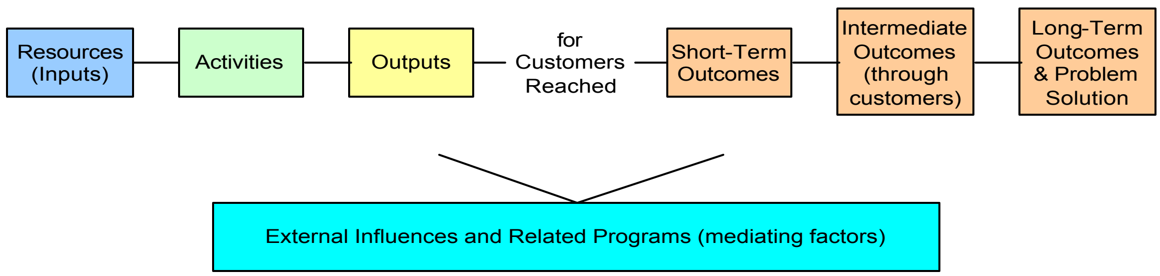
2.6 Logic Models

Logic models are other useful tools that the program can use for program planning, structure, performance and evaluation. A typical logic model includes program inputs, activities, outputs, and outcomes. External factors affecting performance may also be included. Benefits of developing a logic model include: delineating program activities; illustrating outputs and outcomes; identifying external factors, such as the environment, economy, regulation that impact outcomes; illustrating program operation and relationship with the external environment; identifying evaluative processes to determine whether the program is achieving intended results.

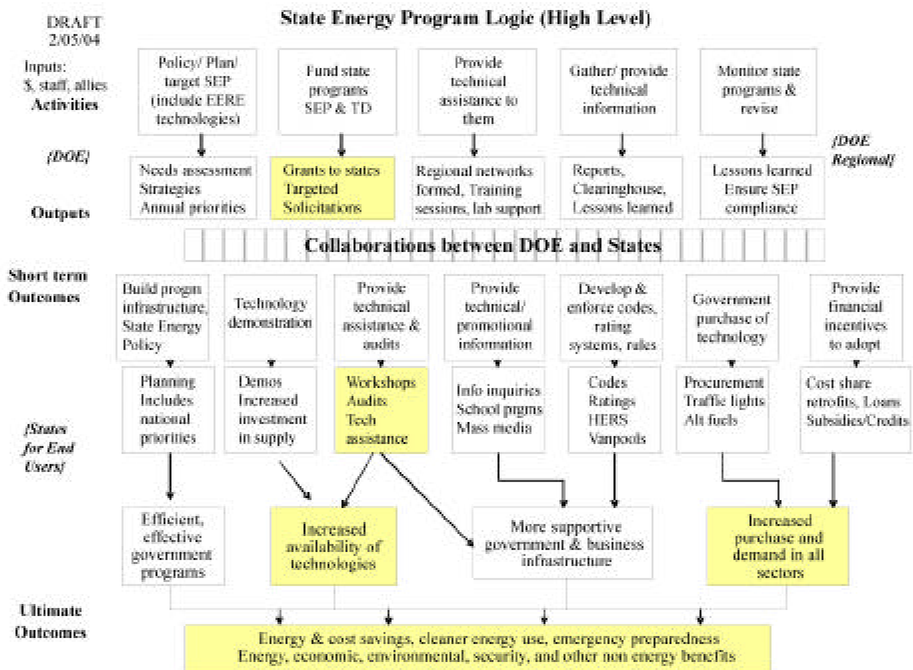


It is through implementation of program design, as described from its underlying structural logic, that a program is able to accomplish intended results (outputs and outcomes) to achieve its broader mission and vision. Technical research and deployment activities, performance measures (e.g., various activity, output and outcome metrics), program benefits, and other elements of program design can be represented in a logic model.

In the case of the program that has already developed and delineated the majority of its inputs, activities, outputs, and outcomes, the logic model can be used as a means of communicating the linkages created by program functions by creating a visual overview that can be contained on a single page.

> **BA Support:** BA can assist programs with the development of logic models. Logic models are a valuable component of multi-year planning.

Example—Logic Model
Weatherization & Intergovernmental Program (State Energy Program)



Once developed, the logic model may be used to develop and select appropriate performance measures. The boxes in the logic model represent potential measurement areas. Performance measures for a program should include both output and outcome measures. For SEP, these may include, but are not limited to, the following measures (associated logic model areas are highlighted in yellow):

Output:	Distribute $41 million in grants to State Energy Offices in FY2006.
Short-term Outcome:	Achieve a 5 percent increase in number of building audits conducted and number of square feet retrofitted with energy efficient technology increasing measurable program results.
Long-term Outcome:	FY06 SEP grants will result in an average annual energy savings of 30-37 trillion source Btu and $200-$230 million in annual energy cost savings with DOE funds.

2.7 Program Benefits

This subsection explains the calculated benefits from program activities using the above anticipated outputs and outcomes. The program should also include benefits here that are difficult or impossible to quantify and therefore cannot be effectively modeled.

In addition, it is critical that the program describe, in the context of the program's mission, vision and goals, how it sees its activities affecting the Nation in the long term. Currently, PBA and the Benefits Analysis Team model program benefits out to 2020 and 2050. Modelers need to know the program's best assessment of **the program's contribution** in each of these two timeframes in order to provide input to the models. [If the program "sunsets" before 2020 or 2050, then substitute the final planned program year.] It is also important to provide estimates of the 2020 and 2050 basecase scenarios **without the program's contribution** in order to calculate the true expected program contribution. Units may be chosen by the program but should mesh with mission, vision, and/or goals.

Key Components

- Corporate benefits data and standard EERE text (*see right hand page*).
- Most recent official benefits projections.
- Unquantifiable benefits and externalities.
- Program impact in 2020 and 2050.
- Base case *without* program activities in 2020 and 2050.

BA Role

BA is responsible for calculating future benefits by working with the Benefits Analysis Team, which represents the TD programs. This ensures consistency across the EERE programs. The Benefits Analysis Team can work with the programs on the 2020 and 2050 estimates described above.

Example – Program Benefits
Business Administration "Boilerplate" Language:

"Using the program-provided outputs and assumptions, PBA works with the Benefits Analysis Team to prepare the technical assumptions needed to run the GPRA-NEMS and GPRA-MARKAL models. These models estimate the economic, energy, and environmental outcomes that would occur over the next 20 and 50 years, respectively, if the program is successful and the future unfolds according to the business-as-usual scenario. PBA then compares the outcomes of model runs that include EERE's programs with the outcomes of runs without EERE's programs. The benefits of EERE programs are determined by the improved economic, energy, and environmental outcomes provided by EERE's activities.

"In the coming years, PBA will extend its benefits estimation tools to address a range of uncertainties. PBA is developing alternative scenarios that will be used to illustrate the value of the current EERE portfolio under different futures along with tools and methods to explore how alternative program goals, budgets, and schedules can make EERE's benefits more robust to withstand uncertainties."

Example – Program Benefits
Biomass Program

Benefits analysis helps the Program quantify and communicate the overarching outcomes from biomass research, development, and deployment—such as imported oil displacement, miles driven on domestic fuels, and greenhouse gas mitigation—using EERE-wide models such as NEMS and MARKAL. The scenarios that are developed and the costs and benefits that are quantified are used to develop a broad understanding of the most viable routes for achieving biomass utilization. Results are useful in crosscutting benefits analysis and are used in decision making across all renewable technologies in the EERE portfolio. Additionally, all the analysis capabilities described in the analysis pyramid will be synthesized into energy market analysis models to develop a broad capability for analyzing the development of possible biomass utilization pathways. This is especially important in the area of environmental analysis, in which renewable technologies are not well characterized. Also important in renewables benefits is a longer horizon analysis model.

2.8 Relationship to Other EERE, DOE and Federal Programs

The program should provide information on how its activities relate to activities of other programs within EERE and DOE, as well as Federal programs at other agencies. This is an opportunity to discuss shared resources or knowledge between programs.

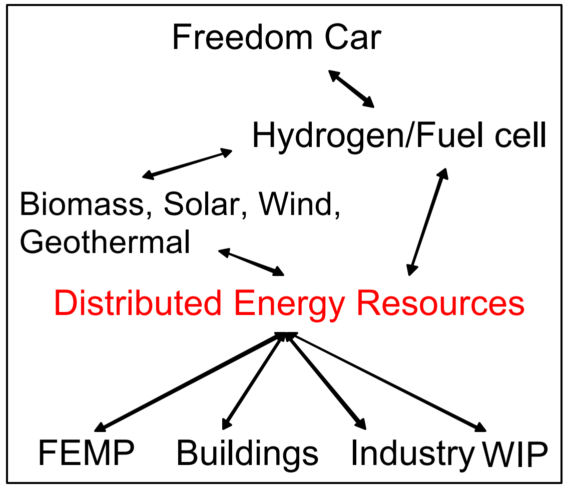
Key Components

- Description of relationships with other programs.
- Description of relationships with programs outside of EERE.
- Examples of projects that show relationships.

Example – Relationship to Other EERE Programs
Distributed Energy

Programs within DE are perhaps most directly related to energy technology programs and systems being developed by other offices within EERE. These other EERE offices include:

- Solar, Wind, and Geothermal Technologies
- Bio-power
- Hydrogen and Infrastructure Technologies
- Industrial Technologies
- Transportation Technologies
- Building Technologies and State and Community Programs
- Federal Energy Management Program



The specific relationships between DE and these other offices within EERE are described below.

Solar, Wind, and Geothermal Technologies. Renewable energy technologies play an important role in hybrid energy systems. Hybrid energy systems combine different power generation devices or two or more fuels for the same device and usually include fossil fuel and renewable systems. Potential hybrid combinations include electrical generators (e.g., fuel cells that use hydrogen; and natural gas-powered turbines, microturbines, and reciprocating engines) that work in conjunction with renewable energy (e.g., solar concentrators, photovoltaics, wind turbines, storage, or geothermal technologies). When integrated, these systems overcome limitations inherent in either one. Hybrid energy systems may feature lower fossil fuel emissions and continuous power generation for times when intermittent renewable resources, such as wind and solar, are unavailable.

Bio-power. When bio-mass is used to produce power, the carbon dioxide released at the power plant is recycled back into the re-growth of new bio-mass. The gasification process advanced through the Bio-power Program converts solid bio-mass raw materials into clean fuels that can be used to supplement or replace conventional natural gas as the feedstock for distributed energy resources.

Hydrogen and Infrastructure Program. The mission of the Hydrogen Program is to conduct research and engineering development in the areas of hydrogen production, storage, delivery, and end-use for the purpose of making hydrogen a cost-effective energy carrier for utility, buildings, and transportation applications—very well in line with the goals and missions of DE. Ultimately, electricity produced using hydrogen will come from sustainable renewable energy sources with fossil fuels serving as a significant transitional resource during this period.

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Industrial Technologies. There are several commonalities between the Office of Industrial Technologies (OIT) and DE. For example, more than 45% of all the fuel burned by U.S. manufacturers is consumed to raise steam. Simple approaches to improving energy performance include insulating steam and condensate return lines, stopping any steam leaks, and maintaining steam traps. These issues directly affect industrial turbine and district energy applications in DE. Further, boilers and furnaces rely on advanced burners to operate cleanly and efficiently. Emissions of pollutants such as nitrous oxides (NO_x) are always of concern in combustion processes; as a result, burner R&D would directly benefit DE's Oil Combustion Program. Industrial facilities can also use CHP applications for an array of heating and cooling processes. And finally, since industrial systems rely on sensors and controls this will allow processes to operate at their optimal conditions.

Transportation Technologies. Many alternative fuel production and end-use technologies are being developed as alternatives to gasoline and diesel fuel, including hydrogen, methanol, natural gas, propane, and other fuels. Public acceptance of these fuels may lead to a more developed natural gas and hydrogen infrastructure, allowing more extensive use of microturbines, reciprocating engines, turbines, fuel cells, and other distributed energy technologies. The new FreedomCAR program, hybrid fossil fuel-electric vehicles, and fuel cell vehicles when they have become available, offer additional examples of this synergy and interaction with distributed energy technologies.

Building Technologies and Intergovernmental Programs. Several programs illustrate the relationship here with distributed energy technologies. For example, *Rebuild America* is a program that focuses on energy-savings solutions as community solutions. A campaign of Rebuild America, *EnergySmart Schools*, says that America's schools spend more than $6 B each year on energy. The DOE estimates they could save 25% of that money through better building design, widely available energy-efficient and renewable energy technologies, and improvements to operations and maintenance. The *Municipal Energy Management Program (MEMP)* was a DOE grant program dedicated to the demonstration and transfer of technologies, strategies, and methods in urban America. The *State Energy Program (SEP)* provides funding to states to design and carry out their own energy efficiency and renewable energy programs. The outcome of this DOE funding is rapid, inventive deployment of new energy efficiency and renewable energy technologies. Finally, the *High Performance Commercial Buildings Research Initiative* develops whole-building design methods that integrate energy-efficient and renewable energy technologies into commercial buildings.

Federal Energy Management Program. The Federal Energy Management Program (FEMP) has the ability to mandate the use of distributed energy technologies and measures in federal buildings. Since there is a history of FEMP issuing orders for federal facilities to meet certain energy efficiency targets, with similar targets the federal government could help manufacturers of distributed energy equipment achieve better economies of scale with guaranteed sales contracts.

SECTION 3: TECHNOLOGY RESEARCH, DEVELOPMENT AND/OR DEPLOYMENT PLAN

This section presents the technical plan for both R&D and deployment programs. There will be a separate technical plan for each program "element," (such as Concentrating Solar Power), as the level of detail of this MYP shifts from the program to the element level. The details of each program element will be examined as if each were a separate program, with goals, approaches, markets, challenges and barriers. This deeper examination is especially helpful to those programs whose activities range across a wide variety of areas and who find it difficult to "roll up" activities into broad, program-level descriptions. As there is variation in the number of elements within each program, programs are should reference each element separately as 3.1, 3.2, 3.3 etc. Template sections being addressed would then follow that numerical sequence. For example the External Assessment and Market Overview for the first element would be referenced as 3.1.1.

The PPAF can be easily applied to each of the program elements, keeping the End State (top row) constant with the program level PPAF, as program elements do not maintain missions or visions within EERE programs. Elements do maintain versions of goals, outputs and outcomes.

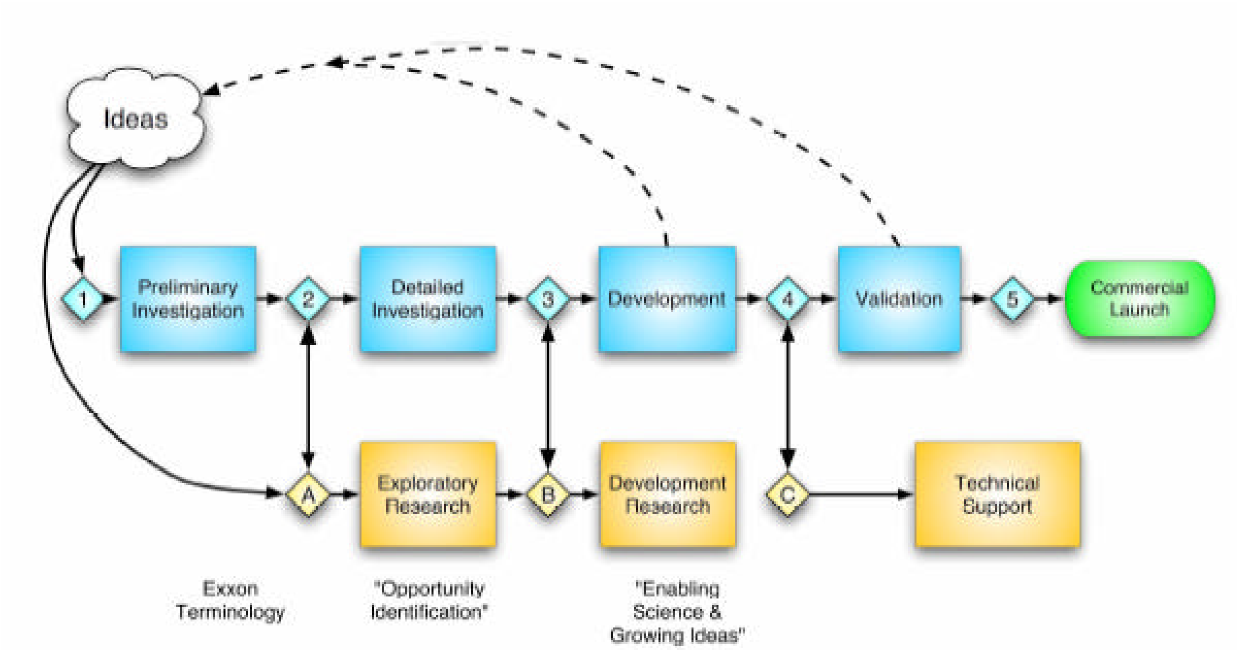
One of the more useful methods for explaining the technology decision-making process (as opposed to the programmatic decision-making progress discussed in Section 2) is the **Stage Gate** process. Stage Gate diagrams show the program's main R&D pathways along with critical go/no-go decision points and milestones.

As there is variation in the number of technical elements within each program, programs should reference each element separately as 3.1, 3.2, 3.3 etc. Template sections being addressed would follow that numerical sequence. For example the External Assessment and Market Overview for the first element would be referenced as 3.1.1 and for the second element as 3.2.1.

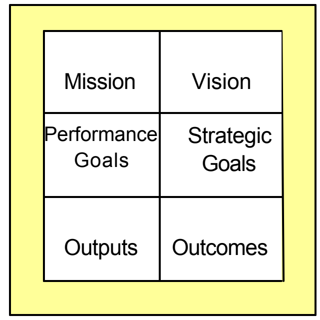
Best Practices: A stage-gated process, which distinguishes between phases of research, development, and deployment, can be used to identify critical decision points.

Best Practice: Program Timeline and Status
Most programs have activities that precede the current planning period (2007-2012) and extend beyond that planning horizon. As such, this Technology Plan provides a snapshot of the program in that five year period. The plan should reflect the current status along the path towards achieving program goals. Acknowledgement of starting points and progress towards goals (or lack thereof) should be called out. The status of all key milestones (decision points), both past, present, and future, should be documented.

Example – Stage Gate Process
Biomass Program



3.1 External Assessment and Element Market Overview



This subsection should provide a descriptive overview of the *external* environment in which this program element operates. This subsection should mirror Section 1.1, but at a lower level of detail and provide a general external context for the technology pathways to be discussed below. In addition, barriers and their possible solutions are to be addressed in much greater detail

Key Components
- Overview of current & potential markets for the technologies in this program element.
- Overview of any political environment nuances involving this element.
- Description of competing technologies.

3.2 Internal Assessment and Program History

As a corollary to subsection 3.1, this subsection provides a short history of public efforts in this area, including any public efforts undertaken in this area prior to the formal creation of this program. The description should show the element's current year efforts in the context of its history as well as highlight major element past accomplishments.

3.3 Element Federal Role

This subsection explains why this element's work is inherently Federal.

Key Components
- Description of how this element contributes to the national need described in Section 1.
- Why should the Federal government conduct this work instead of States, associations or industry?
- What other Federal programs does this element complement?

3.4 Element Approach

This subsection mirrors the program's approach description (Section 1.3), but applies specifically to this individual program element. Description should reflect the information provided in the preceding subsection.

Key Components
- How does the element intend to meet the state goal?
- Why is this approach best suited to meet stated goals?

Examples – Internal Assessment and Program History

Wind and Hydropower Technologies Program

The Wind Energy Program multi-year technical plan includes a sub-section on the *Activity Status* of each major technical pathway within the plan. This section provides the reader with a sense of the recent progress in each area, though only for the most recent preceding years. The section is situated just prior to presentation of the current *Technical Plan*. As such, the reader is presented with the program progression and can have a better sense of the status and direction of the program effort.

Geothermal Technology Program

Similar to the Wind Energy Program, the Geothermal Technology Program multi-year program plan includes a section on *Programmatic Status* for each *Technology Application*. As with the Wind Energy Program, the status includes recent progress, or challenges, related to the technology application. Likewise, this status section appears just prior to the discussion of the current program activities and as such provides some context for those efforts.

Example—Element Approach:

Hydrogen, Fuel Cells & Infrastructure Technologies Program – Systems Integration

The transition to hydrogen vehicle technology requires development of the vehicle components, subsystems, and support systems, as well as the infrastructure. The transition concept described previously suggests combinations of fuels and propulsion systems be explored to get the most out of hybrid propulsion systems and gain experience with hydrogen technology while fuel cells are being developed (briefly described in the following paragraphs). Analysis and testing capabilities and procedures at the national laboratories will be enhanced to comprehend these fuels and powertrains, including simulation tools, component/subsystem integration, and HIL testing, as well as vehicle-level validation of DOE-sponsored hardware development.

3.5 Element Performance Goals

Mission	Vision
Performance Goals	Strategic Goals
Outputs	Outcomes

This subsection addresses the goals of this individual program element.

Key Components

- Description of element goals
- How do these element goals align with the program's goals?

Best Practice: Programs must ensure that program element goals are clear, comprehensive, measurable, and verifiable. Goals are only truly useful if they are easily understood, encompass an appropriate portion of the program's activities, are able to be tracked and measured, and are able to be verified for both internal and external audiences. Goals should always include dates. Element goals, like program goals, should be output-oriented for which the program may be held accountable.

3.6 Element Strategic Goals

Mission	Vision
Performance Goals	Strategic Goals
Outputs	Outcomes

This subsection outlines the strategic goals of the element, if any. These element strategic goals are beyond the program's control, but may be critical to achieving the program vision. If so, the program should develop and monitor *trendable* metrics to track progress, even though the program does not maintain accountability for the success of the element strategic goal.

Example – Element Performance Goals:
Hydrogen, Fuel Cells & Infrastructure Technologies Program- Engine Systems

- Develop and demonstrate an emissions-compliant engine system for Class 7-8 highway trucks that improves the engine system fuel efficiency by 20% (from approximately 42% thermal efficiency today to 50%) by 2010.
- Research and develop technologies that will achieve a stretch thermal efficiency goal of 55% in prototype engine systems in 2012.
- Develop new diesel fuel formulation specifications, which include the use of renewables and other non-petroleum based blending agents, that enable achieving high-efficiency and low-emission goals while displacing petroleum fuels by 5% by 2010.

Example – Element Strategic Goals:

Reduce the cost of hydrogen storage technologies.

3.7 Element Market Challenges and Barriers

Individual market challenges/barriers should be assigned a letter or number for easy reference later.

Key Components

- Describe the current market challenges/barriers for the particular technologies in this program element.

Best Practice: Technical, market, and institutional barriers form obstacles to achieving program goal. A well designed and articulated program plan will address these barriers head on. That is, the program will be designed specifically to address these barriers and hence increase the probability of success.

A simple listing of the barriers is insufficient for planning purposes. A good plan will fully explain these barriers and the relationship to the goals. In this way, it should be easier to demonstrate the relationship of program activities to overcome these barriers and progress towards the goals.

With the goals in mind, and the barriers understood, the program can construct technical pathways (a series of related and interconnected activities) towards goal achievement. A well constructed plan will tie program activities directly to these barriers and give a sense of timing so that the technical pathway has a multi-year dimension that can be readily visualized.

Graphically or tabular presentation of this information is an excellent way to convey this information.

Example—Market Challenges and Barriers
Hydrogen, Fuel Cells & Infrastructure Technologies Program: Delivery

A hydrogen production and delivery infrastructure suitable to support hydrogen fuel cell vehicles does not currently exist. Small-scale distributed production of hydrogen from natural gas or liquid fuels at refueling facilities is a possible approach, but current costs are too high, and distributed production of hydrogen alone will not meet the needs of a hydrogen energy infrastructure. Central or semi-central production of hydrogen can significantly reduce production costs. Lower cost hydrogen fuel delivery technology is needed to enable the establishment of a hydrogen infrastructure.

The following table from HFCIT's multi-year plan links tasks directly to barriers while also showing the timing of those tasks.

	Table 4.6.7. Task Descriptions	
	Description	Duration/Barriers
1	Develop coordinated training module suitable for all local jurisdictions	10 Quarters/Barriers C, D, E
2	Facilitate the adoption of the hydrogen building codes	12 Quarters/Barriers C, D
3	Define mechanism to license standards and model codes for government distribution	5 Quarters/Barriers A, B
4	Define and develop new standards for hydrogen systems	24 Quarters/Barriers O
5	Develop U.S. government position and approval for international standards	10 Quarters/Barriers F, G
6	Develop unified approach to standards development among key countries in Europe and the Pacific Rim	5 Quarters/Barriers H, I, J
7	Develop mechanism to license ISO standards	20 Quarters/Barrier L
8	Implement analytical and experimental program to provide defensible data for vehicle component standards	24 Quarters/Barriers M, N, O, P
9	Implement analytical and experimental program to provide defensible data for refueling station standards	18 Quarters/Barriers M, N, O, P
10	Harmonize international standards	28 Quarters/Barriers H, I, J
Note: The total duration of the program planning period is 32 quarters; tasks that begin before this period or continue beyond it do not reflect durations outside the planning period.		

3.8 Element Technical (Non-Market) Challenges/Barriers

This subsection should provide an in-depth look at the technical challenges/barriers (or non-market challenges/barriers in the case of deployment programs) facing this particular program element. Use the same letter or number reference to challenges/barriers created in Section 3.

Key Components
• Describe technical challenges/barriers.

3.9 Element Strategies for Overcoming Barriers/Challenges

This subsection should contain a detailed description of program strategies designed to address all market and technical challenges/barriers described above. The connection between each strategy and challenge/barrier should be fully explained. Use the same letter or number reference to challenges/barriers created in Section 3.4.

Key Components
• Strategies to overcome market and technical barriers and challenges.

Best Practice: Barriers Linked to Strategies
It is important to not only list barriers, but also to articulate strategies to overcome these barriers. When within the purview of the program, actions to overcome these barriers should be identified and resourced. Usually these will be technical barriers and the primary strategy will be research and development. However there are institutional and market-related barriers for which the program might also have a strategy such as working with regulatory bodies or developing information to better inform consumer choice.

Example—Technical (Non-Market) Challenges/Barriers
Solar Energy Technologies Program: Photovoltaic Energy Systems

- **A.** A key driver in module cost is based on low utilization efficiency and high cost of raw materials. This can be improved through reduction and recycling of waste materials and use of thinner cells (crystalline).
- **B.** Low or limited yields in the manufacturing processes for both crystalline and thin-film modules.
- **C.** Environmental impacts in the manufacturing processes, through generation of potentially hazardous waste substances.
- **D.** Need for better understanding of the properties of encapsulants and their effects on module cost, performance, and reliability.
- **E.** Need for improved processes related to contacts in module design—reduced cost, improved reliability, stability, and performance.
- **F.** Crystalline cells—limitations in effectiveness of cell-to-module processing of strings and tabs.
- **G.** Thin films—temperature sensitivity of inexpensive non-conducting continuous substrates for monolithic production
- **H.** Thin films—low deposition rates for all thin layers limit commercial production capacities.
- **I.** Limitations in cost and reliability of module packaging—in terms of frame components, module ruggedness in an outdoor environment, and overall short and long-term performance.

3.10 Element Tasks

This subsection focuses for the first time on the actual activities and tasks within this particular program element. This should *not* focus on projects, which are at too low of a level of detail for this document. Each task should identify corresponding barriers which this task is designed to help overcome.

Key Components
- Overview of the planned activities.
- Link specific activities to specific challenges.
- Focus at the program element's task/activity level, not at the project level.

GRAPHIC: Tasks should be provided in table format with one column indicating the task number, one column indicating the task or activity that the program is funding to accomplish specific objectives, one column indicating the duration of the task and one column listing the barriers that the task will address. These must correspond to the barriers referenced in the above subsections.

Example- Element Tasks:
FreedomCAR and Vehicle Technologies Program

Task	Title	Duration	Barriers
1	AHHPS Subcontract 1 (Phase I) • Advanced parallel Hybrid Propulsion system Class 4-6 Heavy Hybrid Vehicle	**33 months**	**A,B,C**
2	AHHPS Subcontract 2 (Phase I) • Advanced Series Hybrid Propulsion system Class 7-8 Heavy Hybrid Vehicle	**36 months**	**A,B,C**
3	AHHPS Subcontract 3 (Phase I) • Advanced Parallel Hybrid Propulsion System Class 7 Heavy Hybrid Bus	**36 months**	**A,B,C**
4	Preliminary Heavy Hybrid Technical Targets Development	**15 months**	**A,B**
5	Phase I Heavy Hybrid Modeling, Analysis, and Optimization	**36 months**	**B**
6	Phase I Heavy Hybrid Vehicle Testing and Protocol Development	**12 months**	**C**
7	Phase II Subcontracts – Technology Validation	**36 months**	**A,B,C**
8	Phase II Heavy Hybrid Vehicle Testing	**36 months**	**A,B,C**

3.11 Element Milestones & Decision Points

This subsection adds a temporal component to the tasks described above. A fully fleshed-out pathway for each activity should be provided. This subsection allows the program to highlight key milestones and decision points.

Key Components

- Describe the critical path.
- Use a Gantt chart for each element.

GRAPHIC: Gantt Charts

Element Gantt charts should visually communicate:

- the relationship of the activities within a subprogram;
- the relationship to activities in other sub-programs; and
- decision points to evaluate the program's successes and/or failures in order to direct future program activities.

These points should be communicated by the use of Input, Output, Milestone, and Go/No-go indicators.

- ***Inputs-*** indicate contributions from other sub-programs that will be key to determining whether the program should continue on its current path or redirect some or all of its efforts.
- ***Outputs-*** conversely, would be information provided to other sub-program areas.
- ***Milestones-*** are specific program targets for the completion of planned activities/tasks/etc.
- ***Go/No-go-*** milestones are points where R&D continue/terminate decisions must be made. Where decisions must be made to continue promising RD&D pathways or to discontinue particular activities and redirect efforts and funding to areas that show greater potential.

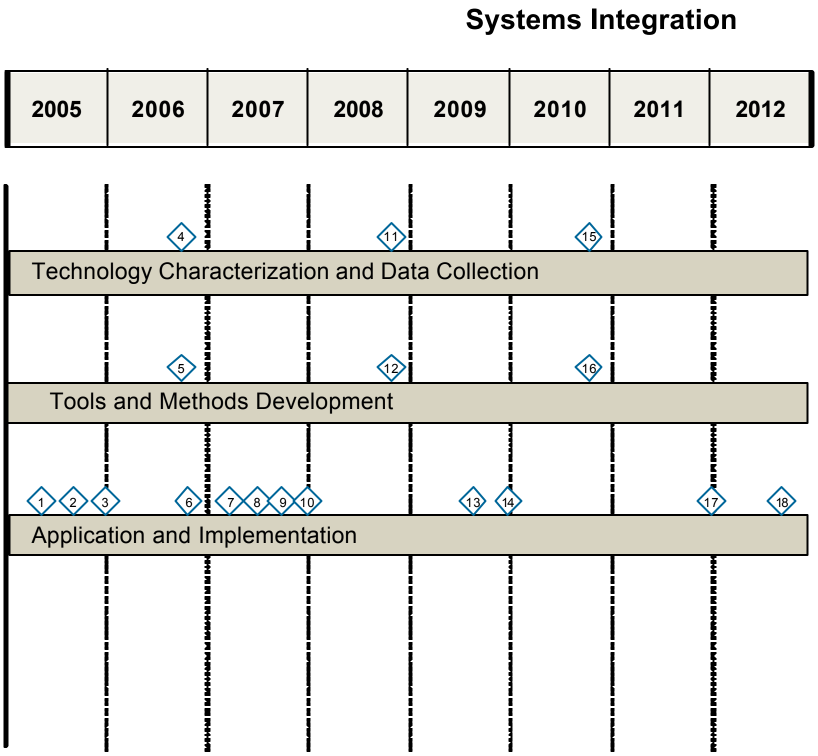
This Gantt chart will provide an easy reference for measuring program success and performance. It should be updated at yearly intervals as underlying technology and market assumptions evolve. The Program will need to remain attuned to these changes and incorporate the consideration of changes to the baseline as part of the revision process.

BA Support: BA can assist program personnel with the development of Gantt charts.

Best Practice: Milestones and Decision Points Tied to Objectives

Milestones are used to identify discrete accomplishments along the way towards an objective. They are critical to determining program progress. A program plan should have milestones that are timed, resourced, and tied to specific program goals. The program should be able to demonstrate how acquisition of a milestone brings the program a step closer to achieving the goal. A subset of these milestones should form key decision points that are called out specifically in the plan. As these decision points are reached, or the time has passed when the key milestone was to be met, the program should re-evaluate progress towards the objective. These decision points form go/no-go decisions as to whether to continue down a particular path or to re-evaluate and redirect resources.

Example- Gantt Chart
Wind Energy Technologies Program – Systems Integration



Milestones

1. Promote development of consensus utility transmission planning principles
2. Complete primer for utilities on expected operational impacts of wind power
3. Complete periodic review by SI Expert Group
4. Ensure availability of efficient wind-plant electrical models for representative wind generation hardware
5. Complete and publish comprehensive summaries of wind's impacts on electric -system operation and ancillary-services costs
6. Complete high penetration study, with validation, for one RTO
7. Complete three case studies of wind forecasting value
8. Complete mitigation study for RTO studied in 2006
9. Complete comparative evaluation of capacity accreditation methods
10. Complete periodic review by SI Expert Group
11. Ensure availability of efficient wind-plant electrical models for representative wind generation hardware
12. Complete and publish comprehensive summaries of wind's impacts on electric -system operation and ancillary-services costs
13. Complete evaluation and recommendations for high-wind penetration scenarios based on production of electricity and hydrogen
14. Complete periodic review by SI Expert Group
15. Ensure availability of efficient wind-plant electrical models for representative wind generation hardware
16. Complete and publish comprehensive summaries of wind's impacts on electric -system operation and ancillary-services costs
17. Complete periodic review by SI Expert Group
18. Complete recommendations for long-range power system planning that optimizes the realization of wind power's overall benefits from a comprehensive IRP perspective

SECTION 4: PROGRAM ADMINISTRATION

The final section of this document contains information on how the program is administered in an efficient manner. This includes a description of the structure of the organization, program implementation, cost management and monitoring, environmental safety and health, and communications and outreach efforts. As compared to Section 2, this section deals primarily with administrative matters that are not essential to the strategic or decision-making processes, but rather support the organization itself (such as cost management) and are therefore necessary to the success of the program and its multi-year planning.

BA Support: BA will provide a substantial portion of the information in this section in order to maintain consistency across plans.

4.1 Organizational Structure

This subsection provides information on the organization of the program, including relationships between program components.

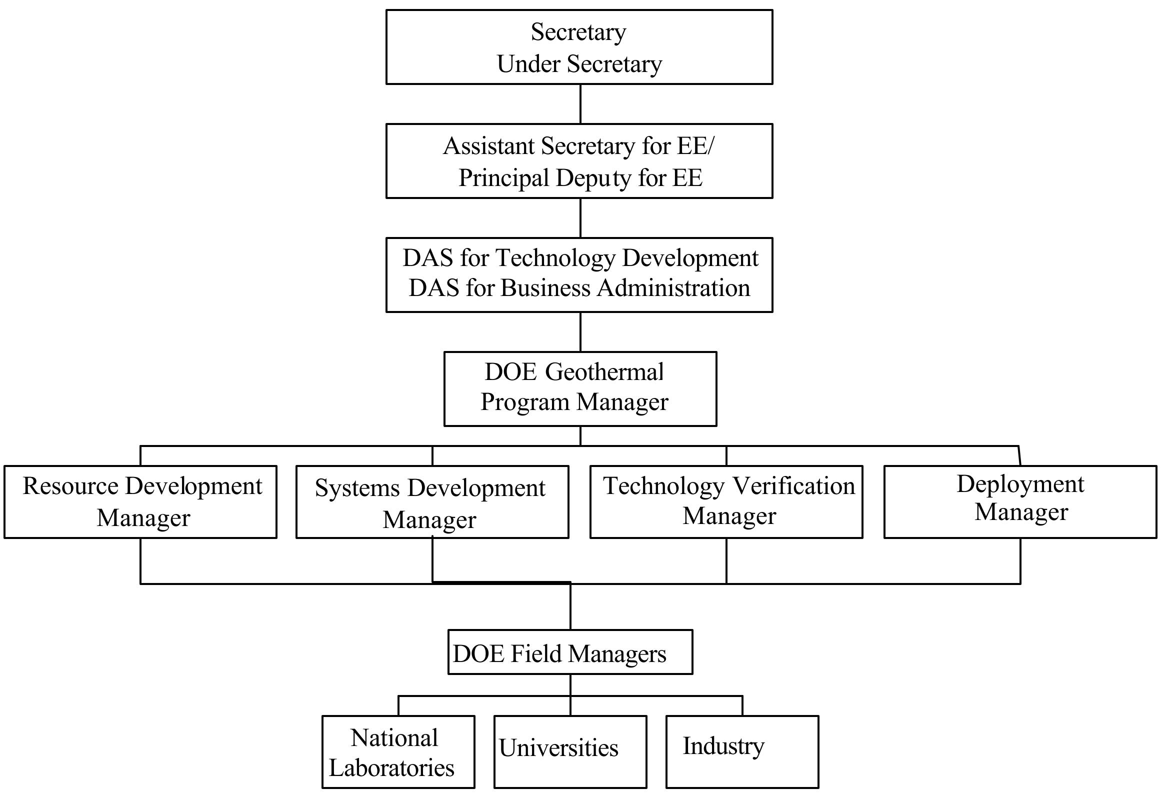
Key Components
- Organizational Chart
- Interoffice working groups
- Technology policy working groups
- Advisory committees
- Interagency coordination

Best Practice: EERE must show strong stewardship of taxpayer dollars. A good program plan will provide through documentation of how the program is managed and structured. A well developed plan will show the roles and responsibilities of individuals and organizations in the prioritization, selection, and conduct of the research agenda. Organizational charts, timelines, and a work breakdown structure are all desirable elements.

To the largest extent possible, EERE uses competitive procurements for project and performer selection. A well documented plan lay outs the process that is used by the program to select and award individual projects. The solicitation process itself should be directly linked to the goals in the plan. The plan identifies what criteria will be used for project selection and the process by which ideas will be solicited, weighed, and selected.

A good management section will also describe the process by which progress is measured and the program evaluated. In a good program plan, the linkage between multi-year planning, budget formulation, and the annual operating plan are clearly spelled out. In short, the reader should be able to ascertain "how" the plan will be accomplished as opposed to the technical details of "what" will be accomplished which is presented elsewhere in the plan.

Example – Organizational Chart:
Geothermal Technologies Program



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Example – Organizational Chart

FreedomCAR and Vehicle Technologies Program

Table 44. FCVT Management Team responsibilities

Vehicle systems	Advanced materials	Fuels	Engines and emission control
• Heavy Vehicle Systems • Ancillary Systems • Simulation/Validation • Energy Storage • Advanced Power Electronics • Hybrid and Electric Propulsion • Testing and Evaluation	• Propulsion Materials (heavy and light) • Lightweight Materials (High-Strength Weight Reduction and Automotive Lightweighting Materials) • High Temperature Materials Laboratory	• Advanced Petroleum-Based Fuels • Non–Petroleum-Fuels and Lubricants • EPAct	• Combustion and Emission Control • Light Truck Engine • Heavy Truck Engine • Waste Heat Recovery • Off-Highway Vehicles

4.2 Program Funding Mechanisms

This subsection describes how the program funds its activities, including in-depth discussion of and explanation for the various funding mechanisms used. Partnerships, cost-sharing and leveraged funds should be discussed here.

Key Components

- **Project Funding Methods**
  - Full funding, Partial funding, Cost share
- **Project Selection Process**
  - Criteria
  - Selection process/ evaluation
  - Participation of SBIR HBCU, SEP, STAC, etc.
- **Partnership and stakeholder roles**
  - Industry, trade, and professional associations
  - Universities
  - State partnerships
  - Other government agencies
  - International and intergovernmental programs

4.3 Cost Management and Monitoring

This subsection should address the program's cost management processes and systems. Specific examples or system names are helpful, along with a description of the processes used. There is no need to delve into fine detail of how costs are managed – the program will be better served by referencing another document or website in which such details are contained.

Key Components

- How project costs are monitored and evaluated against their current performance and the program's priorities
- What systems exist to track costs and uncosted balances?

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4.4 Environmental Safety & Health

This subsection provides a brief description of the program's approach to environmental safety and health issues.

> **Key Components**
> - How does this program ensure that projects and technologies are not harming their environment?
> - What interagency coordination efforts exist related to that purpose?

4.5 Communication and Outreach

This subsection provides a brief description of the program's approach to communication and outreach issues.

> **Key Components**
> - Explain the program's communications strategy.
> - Does the program collect market information for use in technology development decisions?
> - How does the program disseminate information to various stakeholders?
> - Explain how the C&O will relates to these essential participants and thus to a successful program.
> - Explain how the program uses feedback from stakeholders.
> - How does the program's communication and outreach efforts interact with EERE's corporate communications and outreach office.

Example—Communications and Outreach
Biomass Program

To facilitate communication of Program results and other OBP activities, OBP annually develops a communications plan. This plan guides outreach efforts and ensures that communications are effective and consistent. People must become aware of new technology before they can use it. Education and outreach are especially important for biomass because biomass offers significant economic and societal benefits (e.g., energy security, ambient air quality, and reduced GHG emissions) that are not fully represented in its price. Increased use of biomass relies on recognition of the external benefits associated with bio-based options and legislation (financial incentives and compliance). Both of these critical drivers hinge on successful education and outreach. DOE/OBP identified a range of important audiences for communications efforts, each with its own needs for information, interests in biomass, and concerns. OBP identified 10 key audiences:

- Rural/farm community
- State, local, tribal, and regional organizations
- Business/financial community
- International community
- DOE senior management
- USDA and other federal entities
- Industry
- Technology developers/users
- Academia
- Consumers

OBP reaches out to these stakeholders by providing an array of communication products such as publications, a Web site, workshops, conferences, and educational material. All these products are designed to engage industry in developing biomass technologies and practices, stimulate manufacturer interest in applying those technologies and practices, and encourage consumers to purchase biobased products.

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Example—Communications and Outreach (continued)

OBP sponsors technical conferences and workshops on a variety of subjects to accelerate technology development and implementation. Examples are the Bioenergy series of regional conferences and the Biotechnology for Fuels and Chemicals Symposia (rotated yearly between Colorado and Tennessee and organized by NREL and ORNL). A number of regional and state activities are also sponsored. The Regional Offices have considerable activities devoted to information dissemination for EERE programs, including OBP. OBP communicates technology development and other information to industry or customers through various outreach activities, including the Web (www.bioproducts-bioenergy.gov). OBP's Web site provides information on new technologies, solicitations, publications, and legislative activities. It links with key USDA sites and other government and private sector activities, provides information on DOE-sponsored biomass activities, and characterizes the contribution of biomass to the economy.

APPENDIX 1: MYPP Drivers

Numerous legislative, Administration, and Department policies and procedures dictate both the need for, and the process and content of Multi-year program planning over and above program manager's planning needs. These include:

- Government Performance and Results Act (GPRA)
  - Linkage of budget request to outputs and outcomes and to the Strategic Plan
- President's Management Agenda and OMB Program Assessment and Rating Tool (PART)
  - Provide program justification
  - Set performance goals
  - Link dollars to planned activities
  - Establish targets/milestones
  - Measure progress and resulting benefits
  - Include decision points and end points
- CFO
  - Report quarterly and annual milestones linked to DOE Strategic Goals
  - Management and Evaluation (ME-20) Program Plans
- Congress (House Rpt.108-554 - Energy and Water Development Appropriations Bill, 2005)
  - Beginning with submission of the fiscal year 2007 budget request…submit to Congress detailed five-year budget plans for all major program offices and a consolidated five-year budget plan for the entire Department.
  - Preparation of these five-year program plans and the comprehensive five-year DOE plan to be a Federal function

A Program may consult with its contractors in developing its five-year plans, but the actual preparation of these plans is not to be contracted out; this work is to be done by Federal employees of the Department of Energy

APPENDIX 2: GLOSSARY

Activities. All the action steps necessary to produce program outputs.

Activity, Key. The third level of the work breakdown structure, below "program" and "subprogram" and above "project".

Auditable. Justifiable/empirical evidence is available and readily accessible to verify stated results. The documentation should directly confirm the reported result in a clear and consolidated manner. Identifying supporting documentation should not be an afterthought in formulating a performance measure. All submitted performance should include specific documentation that could serve as evidence for the reported result.

Annual Milestone. (see "Milestone")

Baseline. The starting point from which gains are measured and targets are set. The baseline year shows actual program performance or prior condition for the given measure in a specified prior year.

Beneficiary. (see "Customer")

Benefits. (see "Outcome")

Critical Events. A critical path milestone or external factor that affects the achievement of a program outcome.

Critical Path Milestone. (see "Milestone")

Customer. The beneficiaries of the program's products or services, e.g., citizens, business, governments, and internal Federal operations.

Decision Point. A clearly defined point during the performance of an activity where a decision can be made to go on to the next phase, to stop, change direction, or re-focus the activity. Decision points include the identification of circumstances under which the program should end (see "End Point"). A decision point can also be a termination point if the decision is made to prematurely end the activity because milestones have not been reached, or cannot be reached with knowledge that is available or reasonably anticipated (see "Termination Point"). (*Related Concepts*: Off-ramp; Exit strategy; go/no-go decision point; critical path milestone).

Efficiency Measure: A description of the level at which programs are executed or activities are implemented to achieve results, while avoiding wasting resources, effort, time, and/or money. Program efficiency can be defined simply as the ratio of the outcome or output to the input of any program.

End Point. *(Synonyms and Related Concepts.* "Completion Milestone"). The *planned* conclusion of an R&D or deployment activity program that reflects the intended successful achievement of a desired goal.

Evaluation, Program. Systematic studies conducted periodically or on an ad hoc basis to assess how well a program is working. They help managers determine if timely adjustments are needed in program design to improve the rate, or quality, of achievement relative to the committed resources.

External Factor. A factor that may enhance or nullify underlying program assumptions and thus the likelihood of goal achievement. Goal achievement may also be predicated on certain conditions (events) not happening. They are introduced by external forces or parties, and are not of the agency's own making. The factors may be economic, demographic, social, or environmental, and they may remain stable, change within predicted rates, or vary to an unexpected degree.

Go/No-go Milestone. (See "Decision point")

Graduation Criteria: Clearly defined (and almost always quantitative) thresholds of key performance indicators that, when reached, would allow further development and commercialization to be turned over to the private sector under expected future market and policy conditions.

Input. Resources required to produce outputs and outcomes.

Logic Model. A tool to describe the linkages among program resources, activities, outputs, customers reached, and short, intermediate and longer term outcomes. Specific logic model terms are:

- Resources or Inputs include human and financial resources as well as other inputs required to support the program such as partnerships. Information on customer needs is an essential resource to the program.
- Activities include all those action steps necessary to produce program outputs.
- Outputs are the products, goods and services provided to the program's direct customers or program participants.
- Customers receive the program outputs and react in ways that lead to outcomes.
- Outcomes are changes or benefits resulting from activities and outputs. Programs typically have multiple, sequential outcomes, sometimes called the program's outcome structure. First, there are "short term outcomes", those changes or benefits that are most closely associated with or "caused" by the program's outputs. Second, there are "intermediate outcomes," those changes that result from an application of the short term outcomes. "Longer term outcomes" or program impacts, follow from the benefits accrued though the intermediate outcomes.
- "Outcomes" are typically multiple and sequential (sometimes called the program's outcome structure). There are "short-term outcomes" representing changes or benefits directly associated with, or "caused," by the program's

outputs. There are “intermediate outcomes” that are changes resulting from the short-term outcomes, and “ultimate” outcomes that occur in the more distant future. In some discussions of logic models, intermediate outcomes are referred to as “mid-term” outcomes, and ultimate outcomes are called “long-term outcomes.”

- Key contextual factors are external to the program and not under its control that could influence its success either positively or negatively. Antecedent variables are those the program starts out with, such as client characteristics. Mediating factors are those influences that emerge as the program unfolds, such as new competing programs.

Long term. (see “Short” and “Intermediate” term)

Short term	3 years or less
Intermediate term	4-10 years
Long term	10 years or more

Market Failures or Barriers. Deficiencies that obstruct or impede the development of or entry of technologies or practices into the market or prevent efficient operation of the market.

Market Barriers and Failures	Description and Examples
o Deficiencies in information / awareness	Lack of consistent, accurate, unbiased information on the performance, benefits, and costs of different energy technologies and services. End users and decision-makers have limited awareness of efficiency/ renewable options and benefits and costs. Current tax provisions or other subsidies favor other technologies or practices. Principal/Agent issues (information asymmetry) may arise when knowledge of all of the costs and benefits is not fully shared between facilitators or delegated managers and the ultimate customer/decision-maker (e.g., relationship between builders and buyers).
o Policy, regulation	Potentially incompatible policies, regulations, or codes & standards
o Cost and Financing	Limited access to capital (e.g., low-income households, small businesses). Purchasers are more concerned with low first-cost than with life-cycle cost. Financing instruments available do not provide credit for the savings that the buyer will realize.
o Technical capacity and knowledge	Limited knowledge and capacity of service providers, project developers, users, and decision-makers – For example, insufficient skills or experience with ‘systems (optimization)” and how to specify, design whole systems or applications for end-users. Limited experience with transactions and processes necessary to successfully procure and implement a technology or service.
o Risk Aversion	Some potential buyers or users of improved technology and practices may give greater weight in their decision-making to the "downside risk" of a technology failure than they give to the upside benefits of a

	technology success.
o Market fragmentation and undeveloped market structures	Market fragmentation arises when market agents and investors make decisions in one market segment without adequately interacting with others from the other market segments. (e.g., the fragmentation that characterizes the U.S. building industry where developers, designers, builders, utilities, engineers, and occupants pursue objectives which often are at cross-purposes.) Undeveloped market structures include lack of infrastructure to support technology use as has been the case for alternative fueled vehicles which require significant fueling infrastructure).
o Misplaced or Displaced Incentives	The person or organization who would make the decision about adopting a particular technology or practice is different from the one who would derive economic benefits. A classic example is a landlord who makes building investments and a tenant who pays all of his own utilities.
o Externalities	Price signals don't reflect costs – e.g., don't account for many environmental costs, or are not time-differentiated.
o Public Goods	The social benefits cannot be appropriated by any one company to a sufficient degree to justify the required investment.
o Market Power	When firms have market power they tend to cut back production in order to drive up prices and increase profits – e.g., product supply decisions made by a few powerful equipment manufacturers.

Meaningful. A performance measure is "meaningful" if it measures the outputs the program is intended to achieve. Performance measures should be relevant to the program, and therefore capture the most important aspects of a program's mission and priorities. Meaningful measures will be useful for the program partners, stakeholders, and citizens. Although it is tempting to design measures around existing data, those are not always the most meaningful.

Metric. Unit of measurement used to assess an input, milestone, output or outcome measure. Metrics may be quantitative such "dollars per gallon" or qualitative such as "completed/not completed."

Milestone. A measurable, discrete event or accomplishment marking identifiable and measurable progress toward a desired result. Milestones are further characterized as annual performance, critical path, or completion milestones.

- **Annual milestone.** A performance milestone that marks progress toward an outcome on a fiscal-year basis.
- **Critical path milestone.** A performance milestone that must be completed on schedule for an output to be produced on schedule
- **Completion milestone.** The final performance milestone marking a completion decision-point or the achievement of a final output.

Mission Statement. The charter of the program and provides the basis for all subsequent planning activity. Program performance goals flow up into the program's mission.

Objective. (Synonym is "goal." See "Goals and performance measures")

Off-ramp. (See "Decision Point")

Outcomes: Results that are *external* to the program but that are of direct importance to the intended beneficiary and that contribute to the achievement of the program's vision. Outcomes are also useful trend indicators for the program to determine whether or not it is on course to reach its vision endstate. Programs are expected to monitor outcomes, even though they are not ultimately responsible for their accomplishment.

Outputs: Anticipated measurable results from *internal* program activities for which the program may be held accountable. Programs are expected to measure outputs on a regular basis.

Partners. Other agencies and intermediaries responsible for carrying out different aspects of the program including "including grantees, sub-grantees, contractors, cost-sharing partners, and other government partners."

Peer Review. A rigorous, formal, and documented evaluation process using objective criteria and qualified and independent reviewers to make a judgment of the technical/ scientific/business merit, the actual or anticipated results, and the productivity and management effectiveness of programs and/or projects.

Performance Goal. A tangible, measurable target against which actual achievement can be measured, such as a quantitative amount, value or rate. A performance goal must contain a date. Performance goals are output-oriented while program strategic goals are outcome-oriented.

Performance Measure. A general term for any indicator, statistic or metric used to gauge program performance.

Program – a centrally managed set of activities directed toward a common purpose or goal in support of an assigned mission area. Generally, a program is the highest level of work breakdown structure within a specific mission area.

Program assessment: A determination, through objective measurement and systematic analysis, of the manner and extent to which Federal programs achieve intended objectives.

Project – The lowest level of the work breakdown structure. It is an executable element of a program, normally with a discrete start and end point, as well as a scope, schedule and budget. A single project has a program lead, may have multiple phases that cover more than one year, has a project manager and may include multiple awards in support of its objective.

For monitoring and assuring progress, interim and final milestones are instituted as a integral part of the project management process.

Relevance. Attribute of performance measures that are of consequence to the program's mission, vision and goals.

Resources. (See "input")

Roadmap.

Short-term. (See "long-term")

Stakeholder. Persons or groups who are affected by and/or have an interest in the existence and performance of the program. Beneficiaries and customers are subsets of stakeholders.

Strategic Goal. Program goals that aim to achieve the program's vision. Strategic goals are outcome oriented and broader than performance goals and contain elements that are beyond the program's control. They may contribute significantly toward achieving the endstate described in the vision, and are the accumulated program outcomes. As opposed to performance goals, which are output-oriented and more near-term, strategic goals are outcome-oriented and can be longer-term. These measures should be monitored by the program, but not necessarily measured. Program outcome goals should relate to and in the aggregate be sufficient to influence the strategic goals or objectives

Sub-Program. Has the same characteristics of a program (but represents one additional level of division). It is the second level of the work breakdown structure.

Target. Quantifiable or otherwise measurable characteristic that tells how well a program must accomplish a performance measure. Targets must be *ambitious* (i.e., set at a level that promotes continued improvement) and *achievable* given program characteristics.

Termination Point. The *unplanned* conclusion of an R&D or deployment activity program that results from a decision point. An termination point may result from a program successfully meeting its goals ahead of time or from failure to meet performance or other conditions for termination. Industry-relevant programs should identify any "off ramps" in their program plans – whether, when, and how aspects of the program may be shifted to the private sector.

Trendable. A milestone, preferable quantitative, that marks project or program progress using a consistent metric applied on a periodic basis.

Vision Statement. A vision statement describes the desired future state of the market and society that the program intends to help achieve.

APPENDIX X: RESOURCE ALLOCATION PLAN (FOR EERE INTERNAL USE ONLY)

This Appendix includes the five-year projection of resources (budgetary and staffing) required by the program to achieve its goals as stated in its MYP. OMB will provide EERE with an overall budget constraint. After Presidential priorities are addressed, the remaining funds will be allocated based upon senior management priorities.

It is recognized that all programs will not be allocated enough funding to achieve all of their stated goals in FY 2007-2012 and beyond. Thus, it is critical that the plan articulates how significant program priorities will shift over time. **It is imperative that the multi-year budget AND the multi-year goals are consistent as the program's performance will be evaluated on this basis.**

For this section of the document, the following sections must be included:

- ***FY 2007 Financial Information and Outyear Planning.*** Funding needs should be presented for each program element for FY 2007-2012. The resource requirements should be fully coordinated with the technical plan.

- ***Program Priorities*** – Emphases in the programs will shift over time as progress is made, technologies mature, markets change, or many other factors. Indicate *planned* shifts in emphases of the program elements during the five-year planning period.

- ***Human Resources-***Address the current levels of human resources (FTEs) and program direction funding and whether they are adequate to manage the programs. If inadequate, discuss the steps being taken to manage the program and whether these are adequate, in lieu of any abilities to increase Federal FTE levels. Provide explanation if additional FTE's are needed to achieve the program goals

Best Practice: The full cost of achieving each element goal and the overall program goals should be understood. Senior management need to understand the cost of alternatives so that scarce resources can be allocated. All program activities should be fully resourced across the period of performance for the plan. The resource breakdown should follow the work breakdown structure to the greatest extent possible. Ideally, the full cost of achieving each goal is provided over the entire program time span which may start, and end, outside the planning horizon.

Examples – Resource Plans

Biomass Program

The Biomass Program (BP) multi-year technical plan contains resource tables for each major "technical platform" (technology pathway). These resource tables not only show the DOE commitment, but also the partner share. While the full cost of the effort, to the end of the program, is not provided, cost detail is provided on an annual basis, buy sub-element, across the planning horizon. This level of detail facilitates examination of reallocation of resources among these activities and the potential impact on goals.

Table 7: Thermochemical Platform Core R&D Resource Plan

WBS	Title	FY 03	FY 04	FY 05	FY 06	FY 07	FY 08
3	**Thermochemical Platform Core R&D**	**$5,663**	**$5,860**	**$18,372**	**$15,400**	**$13,125**	**$6,740**
	DOE Share	***$4,524***	***$5,860***	***$18,372***	***$15,400***	***$13,125***	***$6,740***
	Partner Share	***$1,139***	***$0***	***$0***	***$0***	***$0***	***$0***
3.1	Feedstock Processing and Handling	$0	$400	$2,875	$2,875	$2,875	$200
3.1.1	NBC Feed Processing and Handling	$0	$400	$2,875	$2,875	$2,875	$200
	DOE Share	*$0*	*$400*	*$2,875*	*$2,875*	*$2,875*	*$200*
	Partner Share	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*
3.1.1.1	Feeder Demonstration	$0	$150	$1,375	$1,375	$1,375	$50
	DOE Share	*$0*	*$150*	*$1,375*	*$1,375*	*$1,375*	*$50*
	Partner Share	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*
3.1.1.2	Feedstock Improvement	$0	$250	$1,500	$1,500	$1,500	$150
	DOE Share	*$0*	*$250*	*$1,500*	*$1,500*	*$1,500*	*$150*
	Partner Share	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*

Federal Energy Management Program

The Federal Energy Management Program (FEMP) multi-year plan likewise provides a budget throughout the planning horizon, albeit, not at the level of detail as compared with the Biomass Program. Given the relatively simpler program structure of FEMP, and the targeted mission, this level of detail may be sufficient for planning purposes. In any case, good program planning will present resources at a level of detail sufficient to allow tradeoffs to be analyzed between program components and the overall impact on goal attainment.

FEMP Budgets, FY03-10
('000 of Nominal Dollars)

Proposed Budgets------------------------------>

	FY03	FY04	FY05	FY06	FY07	FY08	FFY09	FY10
Project Financing	7,838	8,227	7,450	7,100	6,900	6,450	6,200	6,100
Technology Transfer Including ZEB, DER/CHP*	0	0	0	750	1,200	1,950	2,400	2,500
Technical Assistance & Information	7,824	8,242	7,900	7,500	7,300	7,000	6,900	6,800
Outreach & Interagency Coordination	3,383	2,603	2,550	2,550	2,650	2,700	2,750	2,800
Total FEMP (without Program Direction)	19,045	19,072	17,900	17,900	18,050	18,100	18,250	18,200